

AI AUTOMOTIVE INDUSTRIES

**AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT**

JULY 15, 1955

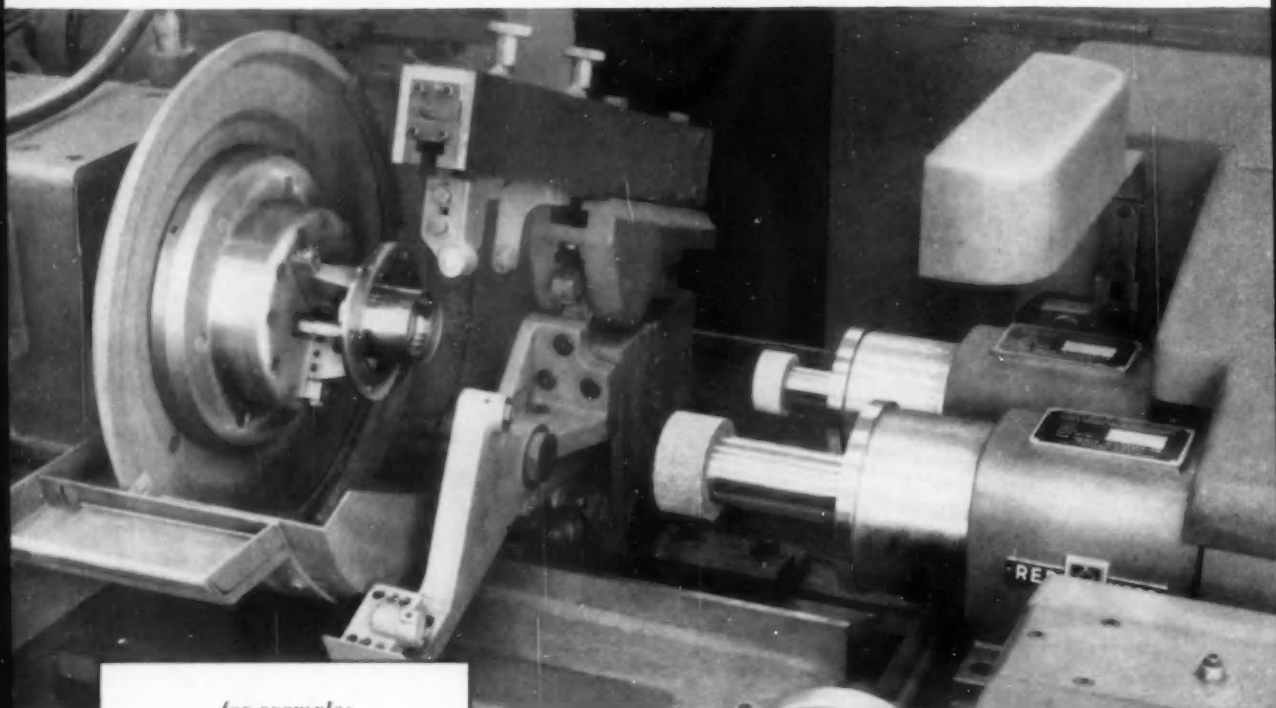
In This Issue

**French Aircraft Industry Regains Former Status
Auto-Lite's Modernized Bumper Plating Plant
Automatic Transmission for Industrial Vehicles
Canadian V-8 Engine Plant Has Latest Tooling
Supersonic Wind Tunnel for Heat Barrier Problems
Automaticity in Tractor Transmission Production**

COMPLETE TABLE OF CONTENTS, PAGE 3

A C H I L T O N P U B L I C A T I O N

how to convert handling-time into grinding-time with a **TWO-SPINDLE HEALD INTERNAL**



for example:

**This Model 271 Size-Matic grinds
SIX DIFFERENT SURFACES
at a single chucking**

Finish grind I.D.—plunge grind bottom face—plunge grind hub face—finish grind O.D.—plunge grind flange face—finish grind flange O.D. All of these operations are done, at a single chucking on the Model 271 two-spindle internal shown above. And by reversing the part in the chuck, the same operations (except flange O.D.) are done on the opposite end—a total of 11 different surfaces on one part in one machine!

Fourteen identical machines are used by one manufacturer to grind 34 different gears and gear hubs, with interchangeable workholding fixtures. That's Heald versatility in action.



THERE'S no profit in handling-time. Loading and unloading—transferring parts from one machine to another—serve only to cut down the overall efficiency of any precision production operation.

Whenever you can combine bore and face grinding—or bore, face and O.D. grinding—on a two-spindle Heald internal, you convert handling-time into actual *grinding-time*. That means faster, more efficient production by performing two or more operations on a single machine, at a single loading. Moreover, concentricity and squareness between Heald ground surfaces are automatically held

to extremely close tolerances.

The versatility of Heald two-spindle internals permits a wide variety of parts to be precision ground on I.D.s, O.D.s and faces in a high-speed, fully automatic cycle. Your Heald representative will be glad to show you how a double-spindle machine can cut costs on your multiple-surface grinding jobs.

it PAYS to come to Heald



Booth 902

AT THE MACHINE TOOL SHOW

THE HEALD MACHINE COMPANY
WORCESTER 6, MASSACHUSETTS

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

Over the Road... or Off the Highway **WAUKESHA**

TURBO-SUPERCHARGED DIESELS

MODEL	Cyl.	*Features	Bore and Stroke	Displ. Cu. In.	Max. Torque @ RPM	Max. HP	RPM
135-DKBS	6	ACTV	4 1/4 x 5	426	400-1800	185	2800
148-DKBS	6	ACTV	5 1/4 x 6	779	706-1800	280	2100
WAKD8S	6	ACTV	6 1/4 x 6 1/2	1197	1062-1600	352	1800

NORMAL DIESELS

185-DLC	6	A	3 1/2 x 3 3/4	216	152-1200	60	2400
190-DLCA	6	AC	3 3/4 x 4	265	191-1400	85	2800
195-DLCA	6	AC	4 x 4	302	221-1800	98	2800
135-DKB	6	ACV	4 1/4 x 5	426	328-1600	147	2800
148-DKB	6	ACV	5 1/4 x 6	779	584-1000	200	2100
WAKD8	6	ACV	6 1/4 x 6 1/2	1197	845-1000	258	1800

GASOLINE

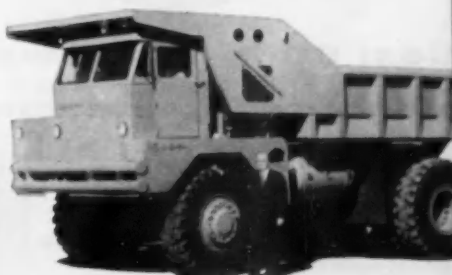
185-GLB	6	A	3 1/2 x 3 3/4	216	176-1400	67	2400
190-GLB	6	A	3 3/4 x 4	265	220-1200	77	2400
195-GKA	6	ACV	4 1/4 x 4	320	243-1600	122	3000†
MZA	6	A	4 1/4 x 4 3/4	404	289-1000	128	2800†
135-GKB	6	ACV	4 1/4 x 5	426	337-1200	147	2800†
135-GZB	6	ACV	4 3/8 x 5	451	354-1200	153	2800†
140-GKB	6	ACV	4 1/2 x 5 1/2	525	425-1000	177	2600†
140-GZB	6	ACV	4 5/8 x 5 1/2	554	448-1100	188	2600†
145-GKB	6	ACV	5 1/4 x 6	779	595-1000	240	2400†
145-GZB	6	ACV	5 3/8 x 6	817	630-1100	250	2400†
WAKB	6	ACV	6 1/4 x 6 1/2	1197	1000-1000	280	1800

*FEATURES: A—Aluminum Alloy Pistons; C—Counterbalanced Crankshaft;
T—Turbo-Supercharged; V—Vibration Dampener.

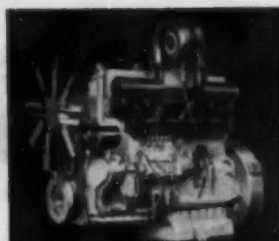
†These engines rated at higher hp and rpm for fire engine service. Send for Bulletin 1079 for LPG ratings and complete listing of engine hp and speed ratings.



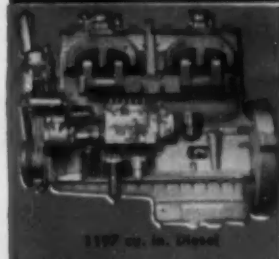
280



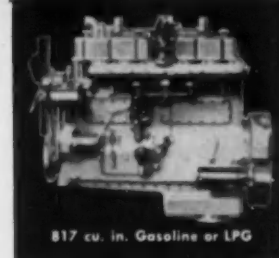
WAUKESHA MOTOR COMPANY • WAUKESHA, WISCONSIN
NEW YORK • TULSA • LOS ANGELES



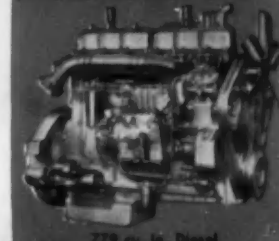
1197 cu. in. Supercharged Diesel



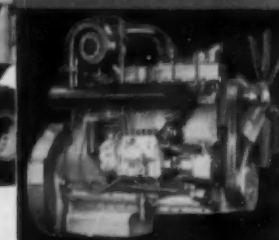
1197 cu. in. Diesel



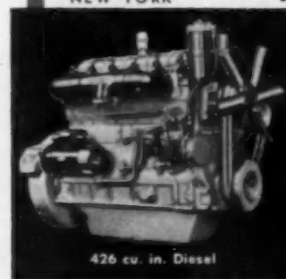
817 cu. in. Gasoline or LPG



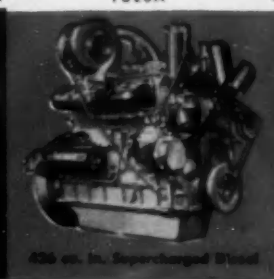
779 cu. in. Diesel



779 cu. in. Supercharged Diesel



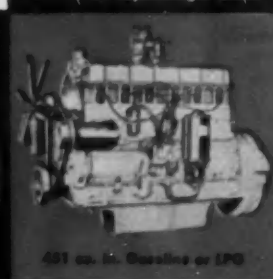
426 cu. in. Diesel



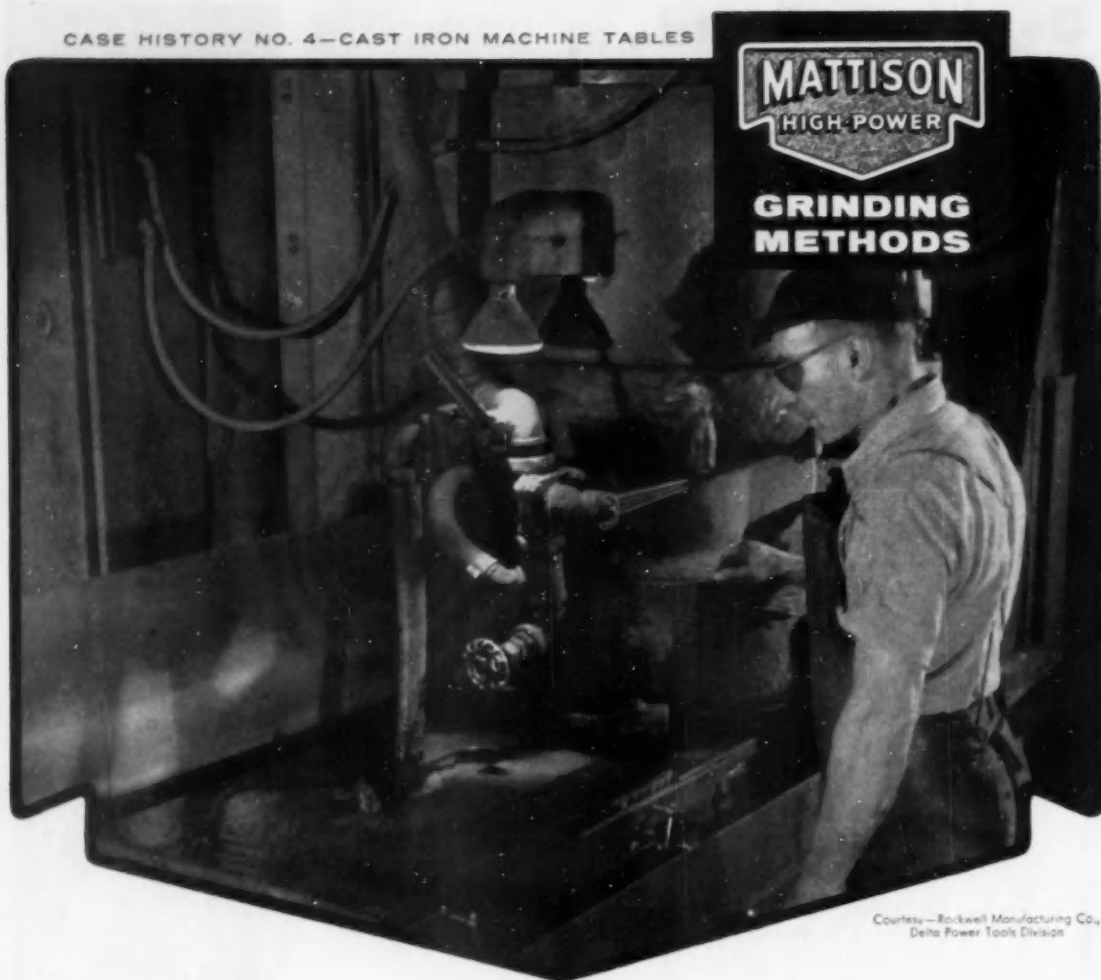
426 cu. in. Supercharged Diesel



554 cu. in. Gasoline or LPG



451 cu. in. Gasoline or LPG



MATTISON
HIGH-POWER
**GRINDING
METHODS**

Courtesy—Bockwell Manufacturing Co.,
Delta Power Tools Division

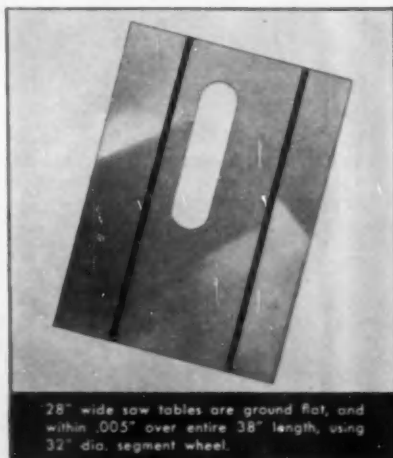
"Cost 60 to 70% lower" ... finishing large saw tables!

By grinding these cast iron machine tables on the Mattison No. 400SS Vertical Spindle Surface Grinder, production costs are 60 to 70% lower than by other methods. This is because the "400SS" is adequately powered and rigidly constructed for high stock removal when machining large, uninterrupted surfaces. The wheel is constantly self-dressing and free-cutting. There's no heat distortion to destroy finish or accuracy ... no downtime for sharpen-

ing a "loaded" wheel. Removing .060" stock, production is 8 to 12 table tops per hour. Mount pads on bottom side are machined at the rate of 35 to 40 per hour. This profit-boosting efficiency, plus the extra-wide work table and 25" wheel clearance of the "Model 400SS," make this machine a truly low-cost method for machining large, plain surfaces. Send your parts to the Mattison Methods Laboratory for free sample grind and production estimate.



**HIGH-POWERED
SURFACE
GRINDERS**



28" wide saw tables are ground flat, and within .005" over entire 38" length, using 32" dia. segment wheel.

AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE

PUBLISHED SEMI-MONTHLY

JULY 15, 1955

VOL. 113, NO. 2

FEATURES

Many Automatic Machines Used for Farm Tractor Transmissions. By Joseph Geschelin	52
French Aircraft Industry. By W. F. Bradley	56
Mechanized Line for Magnetic Parts Inspection	60
Electrostatic Spray for Car Chassis Painting	61
Marbond Process Cuts Weight and Not Strength	62
Toromatic Transmission for Industrial Vehicles	66
Latest Cars at Le Mans Race	67
Wind Tunnel for Future Heat Barrier Problems	68

Taxes vs. Venture Capital. By Lofhair Teetor	69
Auto-Lite Bumper Plant. By Thomas Mac New	70
Maintaining the Automated Plant. By M. Conrad	72
Canadian Plant Turns Out V-8 Engines With U. S. Type Machine Tools. By Joseph Geschelin	74
Latest Plastic Truck Body Design	98
Electronic Disintegrators Have Many Uses	104
Engine Combustion Processes Are Analyzed	108
Japanese Motor Show. By Kazuhiko Aoki	162

NEWS PREVIEWS

Mercury to Build Plant in California	37
Thompson, Ramo-Wooldridge in Financial Pact	37
Chrysler, Universal Products May Merge	37
GM Announces Stock Split and Employee Savings	38
Lincoln Ends Output of 1955 Models	38
20 Millionth V-8 Engine Turned Out by Ford	38
Cutback in Defense Work to Car Makers Shown	39
Wyman-Gordon Acquires Sizable Interest in Prox	39
GAW Principle Now in Some Supplier Contracts	39
Ford Plant at Mahwah, N. J., Now in Production	40
Cadillac Station Wagon First in Its History	41
Thompson Acquires Calif. Aircraft Parts Maker	41
Ford Stock May be Offered to Salaried Workers	42
Car Output Declines After Setting New Record	42
Piasecki to Build Civil Version of H-21	106

DEPARTMENTS

High Spots of This Issue	35
News of the Automotive and Aviation Industries	37
Men in the News	45
Machinery News. By Thomas Mac New	83
New Products	92
Free Literature and Free Information Service	93
New Products for Aircraft	96
The Business Pulse	100
Airbriefs. By Ralph H. McClarren	102
Calendar of Coming Events	128
Shorties	132
On Our Washington Wire	150
More Defense Contract Awards	158
New Defense Facilities	160
New Accessories	192

Business Department Staff	35
Chilton Officers and Directors	35
Advertisers' Index	246

EDITORIAL STAFF

JAMES R. CUSTER
Editor

H. H. ROBERTS
Engineering Editor

THOMAS MAC NEW
Market Research Editor

PAUL C. KENNEDY
Machinery Editor

ANDREW SHEARER
News Editor

ROBERT P. HOMER
Art Editor

MARCUS AINSWORTH
Statistical Editor

HOWARD KOHLBRENNER
Art Director

DETROIT

Joseph Geschelin, Detroit Editor
Leonard Westrate, News Editor, Detroit
Edward Janicki, Associate Ed., Detroit

WASHINGTON

George H. Baker, Washington Editor
Ray M. Stroupe, Washington News Editor
Neil R. Regimbal, Washington News Ed.

LOS ANGELES
R. Raymond Kay
Pacific Coast Editor

PARIS
W. F. Bradley
European Correspondent

LONDON
David Scott
British Correspondent

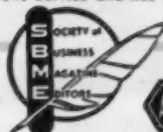
Paul Weston, Washington Member, Editorial Board

As part of its worldwide automotive and aviation news coverage, AUTOMOTIVE INDUSTRIES is serviced by International News Service and has editorial correspondents in major United States and foreign industrial centers.

MEMBER



National Business
Publications, Inc.



Audit Bureau
of Circulations

Copyright 1955 by Chilton Company (Inc.)

AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.
EDITORIAL EXECUTIVE OFFICES, Chestnut and 56th Sts., Philadelphia 39, Pa., U. S. A. Cable address—Autoland, Philadelphia.

AUTOMOTIVE INDUSTRIES. Published semi-monthly by Chilton Co., Chestnut & 56th Sts., Phila. 39. Entered as Second Class Matter October 1, 1925, at the Post Office at Philadelphia, Pa.: Under the Act of Congress of March 3, 1879. In case of Non-Delivery Return Postage Guaranteed. Subscription price: United States, United States Possessions, 1 year \$2.00, 2 years \$3.00. Canadian and Foreign, 1 year \$3.00, 2 years \$5.00; single copies, 25 cents, except Statistical Issue (Mar. 15th), \$1.00.



- greater production
- lower costs
- smaller investment

PRECISION DESIGNED AND BUILT TO MEET THE REQUIREMENTS OF THE AGE OF AUTOMATION

Dixi 60

Horizontal Jig Borer

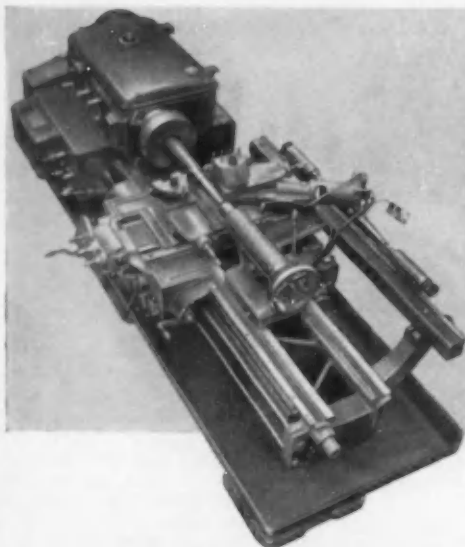
With 5 optical microscopes

A precision machine for boring, drilling, recessing, and milling work. Built-in rotary table with optical microscope can be rotated 360°. Headstock, column, and table settings by optical microscopes to insure overall accuracy of .0002". Table and spindle head have variable hydraulic feed. Mechanical spindle feed can be changed without stopping spindle and is provided with automatic depth stop.

No. 40 taper spindle. Spindle speeds 32-1350 R.P.M. Feeds .0015"—.010" per rev. Table size 28 1/2" x 32 1/2" max. distance spindle to table 19 1/2". Table travel 23 1/2". Spindle travel 24.4".



One of the world's most accurate Swiss-made machine tools



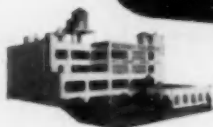
Heavy Duty Lathe High Precision, Reliability, Top Performance Schaefer Model UN-450

Twin cross slides. Copies from cylindrical or flat template either longitudinally or cross. Twin slides permit rough turning and finish turning in the same operation in many instances. Swings 17 1/2" over bed, 9" over carriage, 20-5/64" over gap. Center distance 60". Spindle speeds 31.5 to 1400 R.P.M.

Hydraulic copying attachment can be removed to permit use as a regular twin slide lathe when necessary. 10 H.P. motor drive to spindle. Separate motors for coolant and hydraulic pump. A production lathe built to tool room standards.

- Guaranteed Service by Trained Staff
- Engineering Staff will make recommendations based on your requirements
- Spare parts in Stock
- Your Operators Trained
- Early Deliveries — Some from Stock
- Competitive Prices
- Financing and Rental Plans to Meet Your Requirements

Many More Machines for Every Operation
Write for free illustrated brochure 100,
or state your specific requirements



Write for complete details and prices to Dept. 21
M.B.I. EXPORT & IMPORT LTD.
A Division of Machinery Builders Inc.
475 Grand Concourse, Bronx 51, N. Y.

"Over 20 years experience in designing & building machinery"

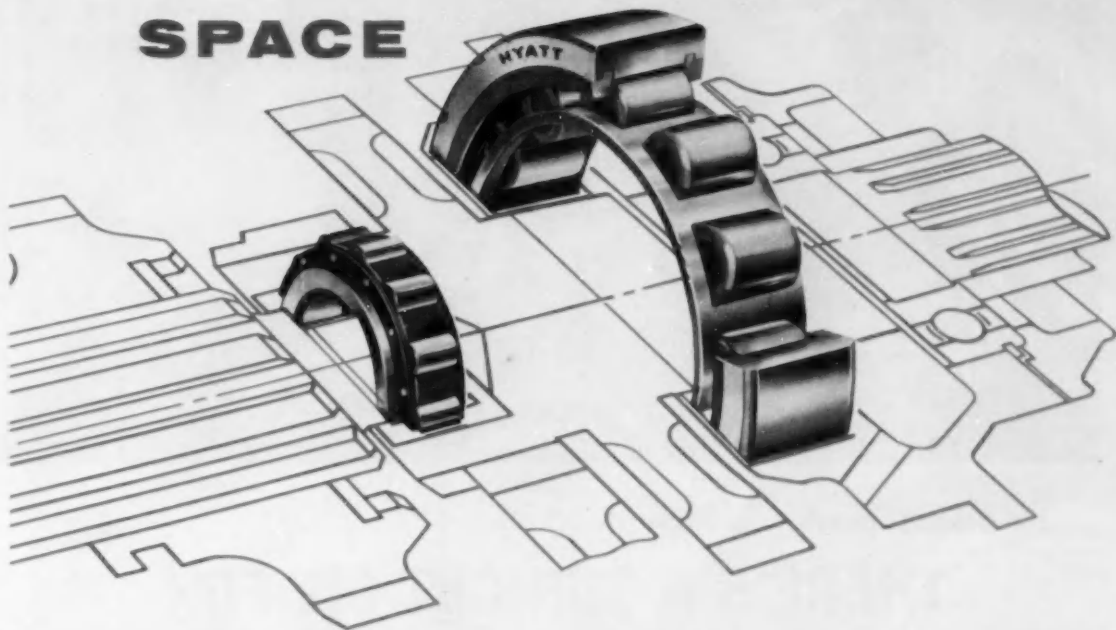
CABLE ADDRESS: Machbuild New York
Phone: MOJH Havek 5-0900

Our Headquarters in New York City

AUTOMOTIVE INDUSTRIES, July 15, 1955

How Hy-Loads can help you

...SAVE SPACE



HY POTENUSE, the sage of the slide rule, SAYS:



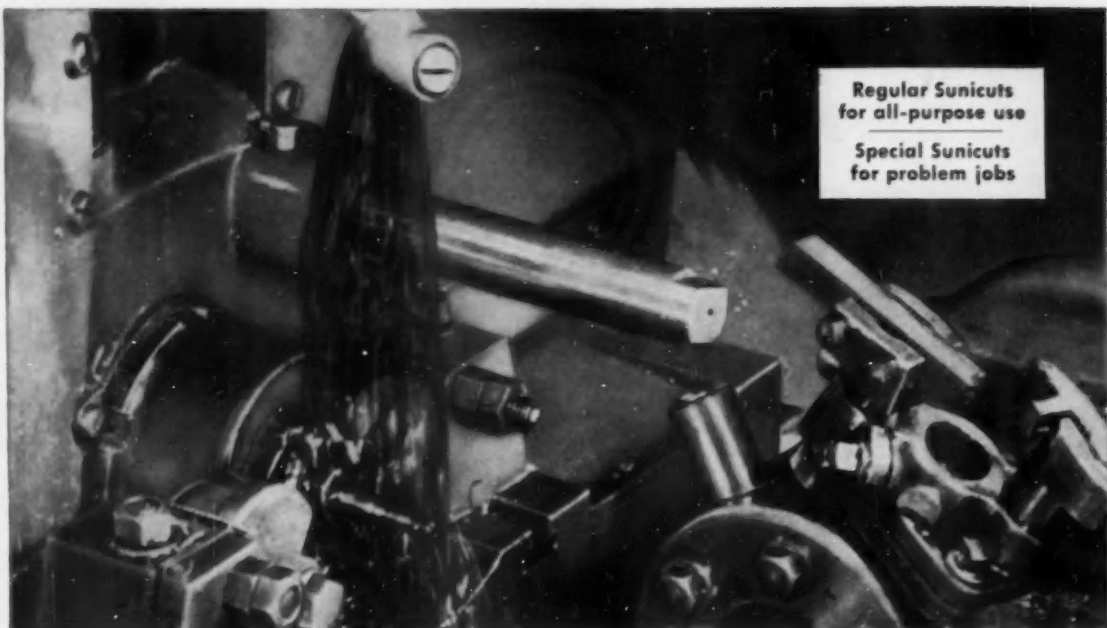
Here's a tractor transmission where the designer's done a mighty fine job of cramming the whole works into a housing with dimensions tighter than McTavish's purse strings!

See how he did it? He used a HYATT BU-type Cylindrical Roller Bearing at the pilot position with the *outer race omitted*. Then on the input shaft he used a HYATT TS-type bearing with the *inner race omitted*. Gear-box size is held to a minimum with maximum bearing capacity! Hyatt makes 4 types of Hy-Loads with separable inner races and 2 types with separable outer races. And brother, they sure come in handy when you're cramped for space! If you haven't a HYATT General Catalog No. 150 handy, better send for yours right now. It'll help you find the answer to lots of pesky problems. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT

STRAIGHT ☐ BARREL ☐ TAPER ☐

ROLLER BEARINGS



Regular Sunicuts
for all-purpose use

Special Sunicuts
for problem jobs

to assure peak production...

THERE'S A SUNICUT OIL FOR EVERY SCREW MACHINE OPERATION

Today's Sunicut cutting oils are the result of years of research and on-the-job testing. And they're versatile, too. In many plants *all* screw machine jobs are being handled by a single Sunicut grade.

For the problem jobs, Sun makes a wide variety of special Sunicut oils, each designed to do the job better.

Your Sun representative has the practical know-how to analyze *your* problems. Working with Sun's experienced engineering staff, he's ready to help you pick the Sunicut oil that will give you the tolerances and finishes you want.

The Sunicut series for screw machines is only part of a large selection of non-emulsifying and emulsifying cutting oils available to help you get peak production at the lowest possible cost.

For complete information about Sun cutting oils see your Sun representative... or write Sun Oil Company, Philadelphia 3, Pa., Dept. AA-7.



INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

NEW



Tomorrow's oil seal here today in Victor Silicones

Type K-6 Dual Lip Silicone Pinion Seal with Flange

Patent 2172325—Sept. 5, 1939
Patent 2233902—Mar. 4, 1941

Superior bonding of Victor silicones to metal channel permits a strong, one-piece, leakproof construction. Internal lip retains lubricant; external lip excludes foreign matter. Valley in between the sealing lips is pre-lubricated for minimum friction. Cartridge-type flange allows ready removal of seal from housing without damage.



Here's the oil seal that makes a complete break with yesterday's sealing elements of tired leather, leather with additives . . . even steps out far ahead of synthetic rubber.

Here, Victor-developed silicones start a new era of automotive sealing progress, in highly engineered designs for tomorrow's tougher, more exacting needs. Tested as original equipment since 1953, Victor Silicone Seals were the first of their kind to merit approval by the auto industry.

Advantages of silicones, found in Victor's earliest pioneering of these compounds, have been developed to

the finest degree. Their suitability for high temperatures beyond 300 deg. F., and for high peripheral speeds, measurably exceeds that of conventional materials. They work well with the new lubricants. Throughout life, the element remains flexible and operative, does not harden or get brittle.

These premium seals can now be specified in the competitive market. Victor's skill in manufacturing—as in development—has led the way to large-quantity production at prices consistent with performance values. Your inquiry is invited.

VICTOR Silicone Oil Seals

Victor Mfg. & Gasket Co., P. O. Box 1333, Chicago 90, Ill.

Sealing Products Exclusively • Oil Seals • Gaskets • Packings

for transportation equipment
that stands up...



FLAT-ROLLED STEEL
produced by a specialist

The kids who roll down Oak Hill in a coaster wagon, and those of us who ride in the world's best automobiles, put a lot of faith in flat-rolled steel.

If you use flat-rolled steel in your products, rely on a specialist—Great Lakes Steel. Our entire organization is devoted to the business of making more and better flat-rolled steel for every application. Many manufacturers have found we have some unique qualifications to help them to improve products and reduce costs. We would like the opportunity to work with you on your problems.

Call on our 25 years of specialization in flat-rolled products. Our representative will be glad to discuss your particular needs at your request.

GREAT LAKES STEEL CORPORATION
Ecorse, Detroit 29, Mich. • A Unit of

NATIONAL STEEL CORPORATION



SALES OFFICES IN BOSTON, CHICAGO, CINCINNATI, CLEVELAND, HOUSTON, INDIANAPOLIS, LANSING, LOS ANGELES, NEW YORK, PHILADELPHIA, PITTSBURGH, ROCHESTER, ST. LOUIS, SAN FRANCISCO AND TORONTO

Ross Steers Them All

Passenger Cars	Cranes
Tractors	Sweepers
Combines	Pumpers
Trucks	Carriers
Buses	Earth Movers
Graders	Fork Lifts
Shovels	
Boats	



STEERING

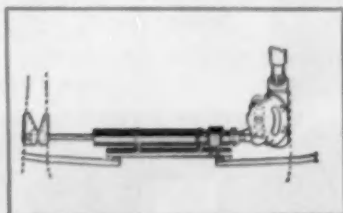
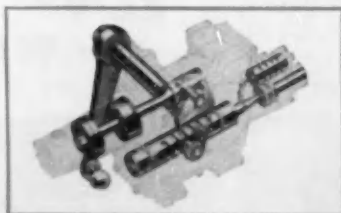
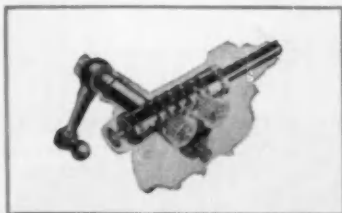
► ROSS—the name to *depend* on—for the *finest* in steering for nearly a half century.

ROSS provides the *right* gear for *every* steering need—manual or power.


ROSS designs and builds 'em *better*—for new steering ease . . . trouble-free performance . . . long service life . . . maximum economy.

ROSS invites discussion of *any* steering problem.

ROSS GEAR AND TOOL COMPANY, INC. • LAFAYETTE, INDIANA



CAM & LEVER MANUAL . . . HYDRAPOWER INTEGRAL . . . HYDRAPOWER LINKAGE



PRECISION-CUT PARTS

our business since 1899

There is no phase in the production of wool felt in which Western Felt is not engaged. We start with lambs wool, and end with an endless variety of parts for the many jobs that only felt can perform.

Through it all, we're proud to say our methods have built an enviable reputation for engineering precision. Hard or soft, large or small, Western Felts can be relied upon to meet your specifications.

Tell us your basic problem—and we'll put 55 years experience to work in recommending a solution for you. Our engineers find new uses for felt every day. Your inquiry will receive prompt attention.

WESTERN

4021-4139 Ogden Ave
Chicago 23, Illinois

Branch Offices in Principal Cities

Felt

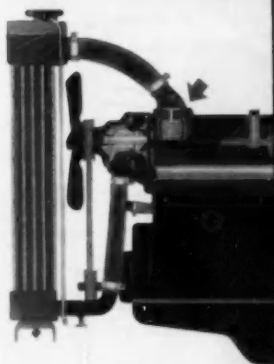


WORKS

MANUFACTURERS AND CUTTERS OF WOOL FELTS



'TRAFFIC COP' FOR YOUR COOLING SYSTEM!



The Harrison thermostat directs the "stop and go" of water flow through the engine cooling system. Accurate and dependable—it automatically maintains right temperature for top performance.

Another important Harrison assignment!

Harrison's on the "heat beat"! Today's modern high-compression engine demands *the last word* in accurate, dependable thermostat control! That's why leading car and truck manufacturers specify *Harrison* thermostats! In fact, all Harrison heat control products—from helicopter engine oil coolers to passenger car air conditioning systems—are *engineered* to assure dependable, economical service! And every Harrison heat control product is backed by more than 44 years of research and manufacturing experience. If you have a hot or cold problem, look to Harrison for the answer!

HARRISON RADIATOR DIVISION, GENERAL MOTORS CORP., LOCKPORT, N. Y.

HARRISON

TEMPERATURES
MADE
TO
ORDER

you are invited to see our
"LIVING CATALOG"

of the newest

LAPORTE

BROACHING MACHINES

in action...at



booth 707



See the VUE-7

Electric Drive Pull-Up machine: broaching spiral gears, 2 at a time, at the rate of 320 parts per hour! (The world's first electro-motive powered pull-up broaching machine.)

See the SRHE

Electric Drive Horizontal machine: broaching jet engine turbine discs at a speed of 280 feet-per-minute!*

See the SPECIAL

72" Horizontal Electric Drive machine: the first of its kind for internal or external broaching. This machine is broaching involute gear sprockets, a surface broaching operation on sprocket, with 25 teeth, at rate of 25 complete parts per hour.

See the CONTINUOUS

Broaching machine: broaching automotive connecting rods at the rate of 1200 parts per hour, using 24 fixtures per machine.

See the HP-10

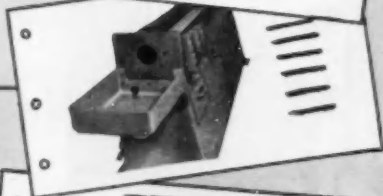
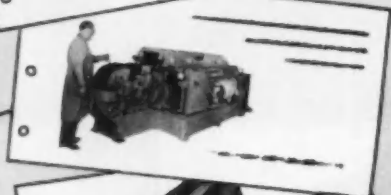
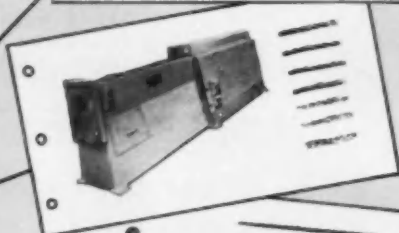
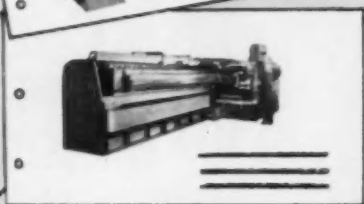
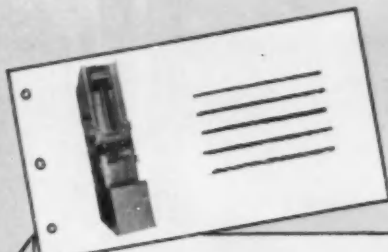
"Toolroom" broaching machine: broaching standard keyways in gears. (A small, universal machine, 48" stroke.)

See the SHARPENER

with micro-feed attachment sharpening and backing off all types of broaches. 36" size, with high speed spindle.

* The fastest broaching operation ever performed
 ... finish-broaching more than 235 "pine tree"
 slots per hour!

This is your opportunity to be brought up to date on the amazing progress that has been made in the past few years in BROACHING, the modern method of machining metal!



THE **LAPORTE**

MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

In England: Watford, Hertfordshire



THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES



ECONOMICAL

LONG WEAR

QUIET RUNNING

SMOOTH OPERATION

WEAR COMPENSATION

HIGH LOAD CAPACITY

FLEXIBILITY

WHY

these LINK-BELT TIMING CHAINS

are standard equipment
on 1955 automobiles

It's the timing
chain that offers
you all of these
important advantages

WHY the strong preference for Link-Belt Timing Chain? First, for the flexibility and superior performance of timing chain itself. Too, because Link-Belt offers segmental bushed joints with anti-whip, anti-back-bend features for quiet operation and long life. Let our engineers supply a test drive to your specifications. And for full information, get Book 2065.

**Segmental bushings provide
automatic joint snugness
for wear compensation**



Segmental bushings are made with slight bow.



After initial assembly in chain, bushings are straight.



Bow in bushing acts to keep a snug joint on non-load side, maintaining chain pitch automatically.

LINK-BELT

TIMING CHAINS AND SPROCKETS

LINK-BELT COMPANY, 220 South Belmont,
Indianapolis 6, Ind.

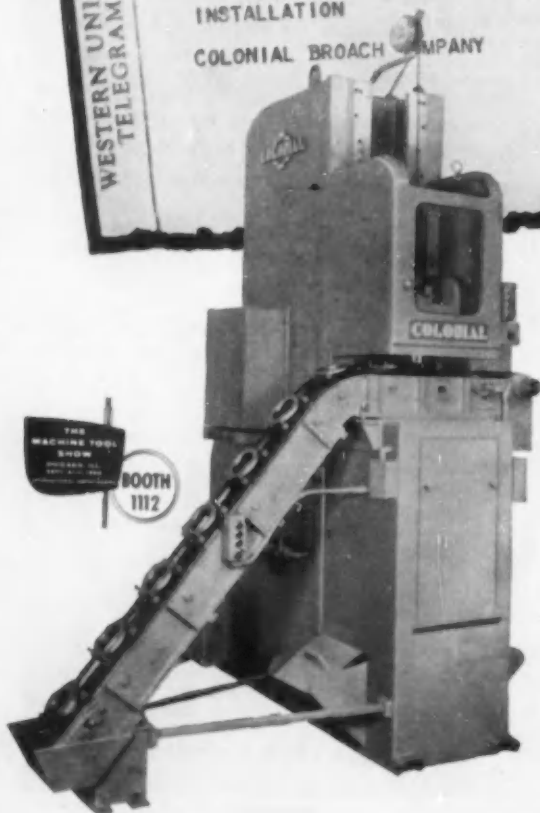
WESTERN UNION
TELEGRAM

WESTERN UNION
TELEGRAM

WESTERN UNION
TELEGRAM

CMC 6 WUX MARCH 9 1955 2:05PM

EVERY 12 SECONDS INSIDE DIAMETER ON A DIFFERENTIAL RING GEAR IS BROACHED TO CLOSE LIMITS ON THIS AUTOMATED SETUP 100 PER CENT EFFICIENCY GIVES A PRODUCTION OF 300 PER HOUR OPERATOR LOADS CONVEYOR FROM FLOOR WITH FOUR STATIONS IN EASY REACH GRAVITY UNLOADS BROACHED RING GEAR BLANKS REPEATING 12 SECOND CYCLE IS (1) PULL-UP WORK STROKE (2) INDEX TO RETURN POSITION (3) RETURN STROKE (4) INDEX TO BROACHING POSITION CONTROLS ARE COMPLETELY SAFETY INTERLOCKED REQUEST BULLETIN RU-54 FOR SPECIFICATIONS ON STANDARD 15-TON 48-INCH STROKE COLONIAL PULL-UP MACHINE IN THIS UNIFIED BROACHING INSTALLATION
COLONIAL BROACH COMPANY



every 12 seconds!



UNIFIED BROACHING is the key to successful broaching

AUTOMOTIVE INDUSTRIES, July 15, 1955

if the
FLEET OWNER
 built his own trucks—



ZENITH
 CARBURETORS

They say it's a buyer's market. Well the truth is, for the truck operator, it's always been a buyer's market.

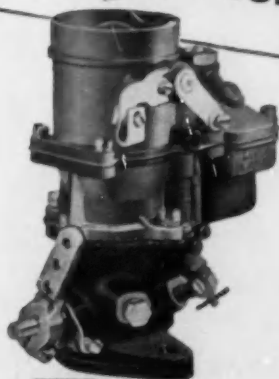
No American businessman sets more exacting standards than the fleet operator in his purchase of new equipment. There is good reason for this, for the operator's success or failure is to a very large degree determined by the efficiency of the vehicle he employs.

This yardstick of efficiency is likewise applied to every component part that contributes to truck performance.

That's why you can be certain if truck operators built their own trucks, Zenith* would be the choice for standard equipment.

One more reason why—if you build, buy, sell or operate trucks, Zenith should be *your* choice for the best in carburetion.

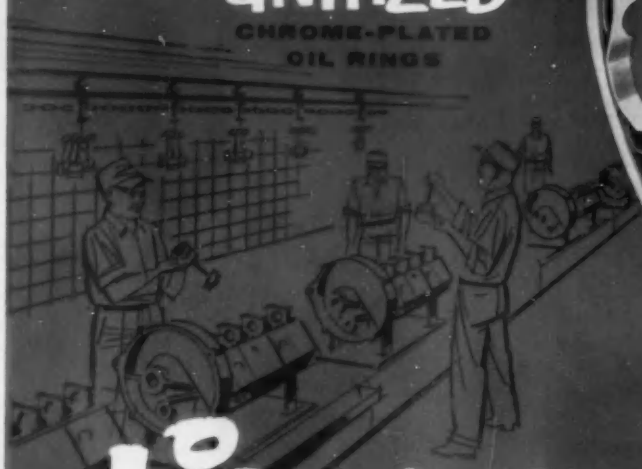
would be *his* choice



ZENITH CARBURETOR DIVISION OF **Bendix**
AVIATION CORPORATION

696 Hart Avenue, Detroit 14, Michigan • Export Sales: Bendix International Division, 205 East 42nd St., New York 17, N. Y.

MUSKEGON
"UNITIZED"
 CHROME-PLATED
 OIL RINGS



CSR-200

First of Muskegon's famous
 "Unitized" chrome-plated
 multiple-piece oil rings
 proved on America's
 greatest production lines
 and in the best cars.
 Rails and spacers are
 correctly pre-assembled and
 "Unitized" to handle like
 a one-piece ring.

time-saving

... installs twice as fast as any other multiple-piece ring!



new
CSR-400

More than ever before, *time is money* on the engine assembly line! That's why Muskegon "Unitized" piston rings have become an important factor in the design of new and better engines... they handle like a one-piece ring and install faster than any other multiple-piece ring and without special installation tooling!

Now you can choose from two "Unitized" designs: Muskegon's famous CSR-200 chrome-plated oil rings that revolutionized piston ring installation on the assembly line; and the advanced new CSR-400... with a circumferential expander.

Nothing can equal these rings for faster, more economical error-proof installation. Muskegon's patented "Unitizing" process holds the pieces tightly together, in the right order, during installation. That is done with a special adhesive that dissolves during the first engine run, permitting the pieces to separate and function independently of each other. By chrome plating the rails, Muskegon greatly reduces ring wear, bore wear, scuffing and friction.

But prove these important advantages to yourself! Consider Muskegon's CSR-200 or new CSR-400 rings for your engines. Write us today for complete facts.

Most recent new Muskegon development... CSR-400 chrome plated oil ring with circumferential expander. All four pieces are "Unitized," a Muskegon exclusive, for easy handling and installation.

From FORD... The engine builders' answer!

MUSKEGON
Piston Rings

MUSKEGON PISTON RING CO.
 MUSKEGON, MICHIGAN
 PLANTS AT MUSKEGON AND SPARTA

DETROIT OFFICE:
 521 New Center Bldg.
 Telephone, TRinity 2-3113

Production Pointers

from

GISHOLT



THE
MACHINE TOOL
SHOW
CHICAGO, ILL.
SEPT. 17-19, 1964
INTERNATIONAL EXHIBITION



BOOTH 1413

The Gisholt MASTERLINE medallion will identify this new and improved series of machines to be shown for the first time at the Machine Tool Show in Chicago in September. See them at work in Booth 1413.

PRE-SHOW ISSUE

SINGLE PASS JETRACER IS DOUBLE-TOOLED TO SPEED PRODUCTION

Unique Setup on No. 12 Automatic Lathe Cuts Costs on Differential Gears

Jobs like this may open your eyes to some new money-saving ideas with the Gisholt JETRACER unit. Here's how this manufacturer does it:

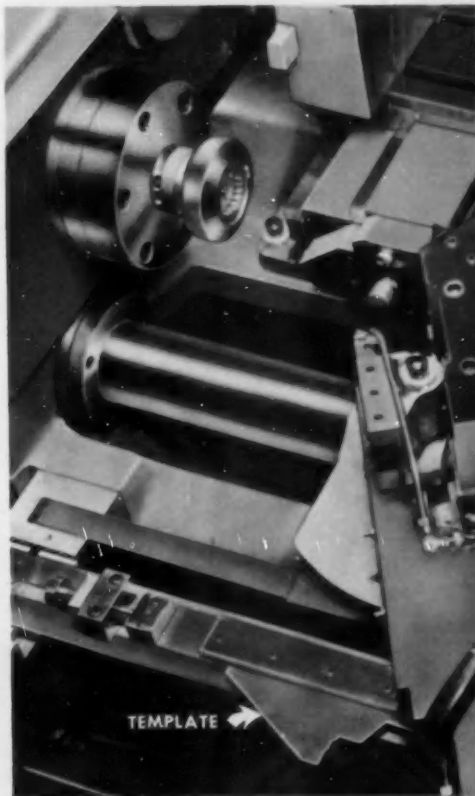
To machine steel forgings for differential gears, two No. 12 Automatic Lathes are equipped with JETRACER units, both of which are double-tooled. Gears are held on a segmented-sleeve type air-operated expanding mandrel and driven by a key in the splined I.D. Double-tooling on both tracer slides makes it possible to complete each operation in a single pass.

The line drawing illustrates the first operation. Tool "A" faces the bevel, chamfers the edge and turns the O.D. As tool "A" completes its cuts, tool "B" engages work, facing, co-boring, facing the co-bore and chamfering the corner of the splined I.D. Meanwhile, the rear slide feeds in with a single tool to face the back of the flange and shave-turn part of the hub. Floor-to-floor time is a fast 0.8 minute.

The second operation on the other end is completed in the same manner on the second No. 12 Automatic Lathe, also in 0.8 minute. One operator handles both machines to keep production humming.

It's the combination of smart tooling on the JETRACER unit with the speed of the No. 12 Automatic Lathes that accounts for the swift, accurate production of these parts.

(If you'd like to see more cost-cutting JETRACER applications, ask for folder —Form 1171.)



TEMPLATE



Layout for 1st operation



Work piece for 2nd operation

Machining of these differential gear blanks is done with setup shown in drawing. Tools on tracer slide engage in quick succession while simultaneous cut is made with rear slide. Note template for tracer follower at bottom of machine photo.

At the SHOW:

No. 12 and 24 AUTOMATIC LATHES—See single and multiple passes with JETRACER Unit. Three new models; one with full automation.

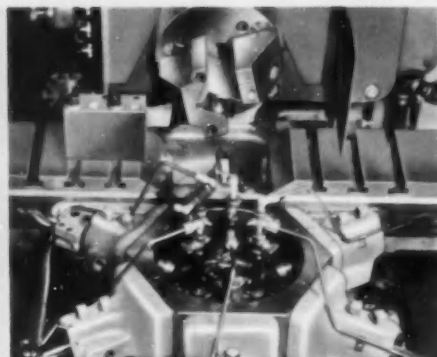
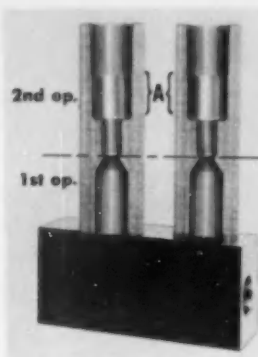


CUTS COSTS BY COMBINING INTERNAL MACHINING AND BURNISHING

To cut costs on these steel block check valve bodies, the producer wanted them internally machined and burnished in two sequential operations on two 1F Fastermatic Automatic Turret Lathes.

By using a special two-jaw air chuck, the job was quickly and simply accomplished. Used for both operations, the special chuck has one stationary jaw, V-block shaped, to locate the work on center, with a dead stop at the rear for longitudinal location. The second jaw clamps the piece by moving in and out.

In the first operation, the valve seat is drilled, formed and reamed; the large bore is taper reamed; and the valve body is faced on one end. Time: 1.46 minutes. In the second operation, the other end of the piece is drilled, bored, co-bored, chamfered and reamed. The operation is then completed by feeding a special turret-



With a minimum of special equipment, the Fastermatic incorporates the internal burnishing operation as part of the automatic cycle.

mounted burnishing tool into bore "A" to obtain a 20 micro-inch R.M.S. finish. Time: 1.78 minutes.

Total time for the first operation is only 1.46 minutes, and only 1.78 minutes floor to floor time is used for the second operation—including burnishing bore "A" to a 20 micro-inch R.M.S. finish.

AT THE SHOW:

FASTERMATICs—continuous automatic operation. New setup features make small lot production economical with simple, fast changeover.

Long oil well drill tubes machined quickly, easily with this setup

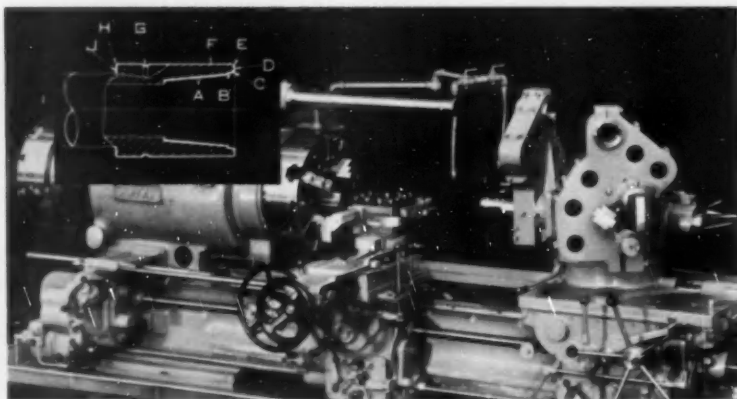
What's the fastest, easiest, safest way to hold an oil well drill tube and machine on end?

Here's one way of doing it:

The long tube is "double-chucked" in a 4L Saddle Type Turret Lathe, using two 24" 3-jaw scroll chucks, one at front and one at rear of the spindle. Result: whip is prevented; distortion is avoided.

Machining is low-cost and simple. First, "D" is faced from the square turret. Next, "A" is step-bored from two multiple-tooled stations on the hexagon turret, which also rough and finish co-bore "B," chamfer "C" and "E" and turn "F." Two more stations on the hexagon then rough and finish taper ream "A," and a special holder on the square turret simultaneously grooves "G," chamfers "H" and faces "I."

"A" is then single-point threaded, using the full-length lead screw and



a special taper attachment cam on the square turret carriage. This completes the job.

Machining long workpieces without whip and distortion is simple, fast and easy with this two-chuck setup on a Gisholt Saddle Type Turret Lathe.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

AT THE SHOW:

SADDLES—new higher speed,
more powerful machines.
JETRACER will be demonstrated
on both bridge type cross slide
and hexagon turret mounting.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★



LOOK AHEAD...KEEP AHEAD...WITH GISHOLT

THE SHOW... SEE GISHOLT!

THE
MACHINE TOOL
SHOW



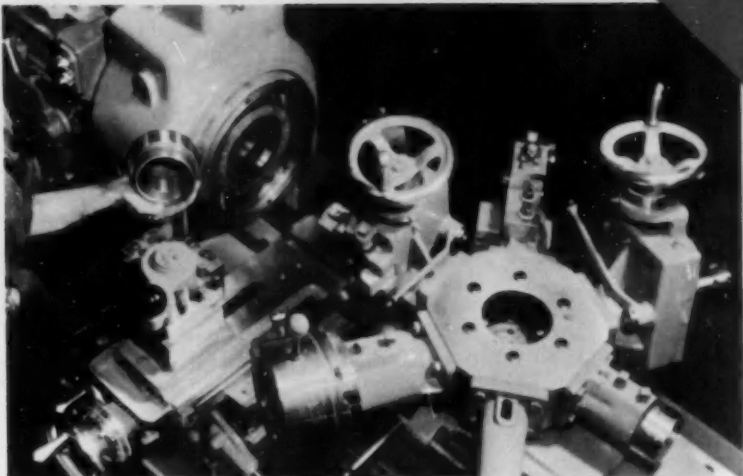
BOOTH 1413

HERE'S EXTRA SPINDLE BORE CAPACITY WITH OUTSIDE-OPERATED COLLET CHUCK

Here's a good idea to keep in mind: You can work right up to the limit of your spindle bore capacity. This producer is doing it with his Gisholt No. 5 Ram Type Turret Lathe, tooled to machine threaded adapter bushings from 4½" seamless steel tubing. An outside-operated collet chuck does the trick.

Tooling is also well planned. Parts are finished in minimum time—only 4.2 minutes floor to floor. Hexagon turret tools bore, co-bore, turn, form, chamfer, thread the O.D. and tap the I.D. Square turret tools face and chamfer with cut-off from the rear tool post.

An outside operated collet chuck arrangement provides the extra capacity needed to complete this job and permits using a smaller, less expensive machine.



AT THE SHOW:

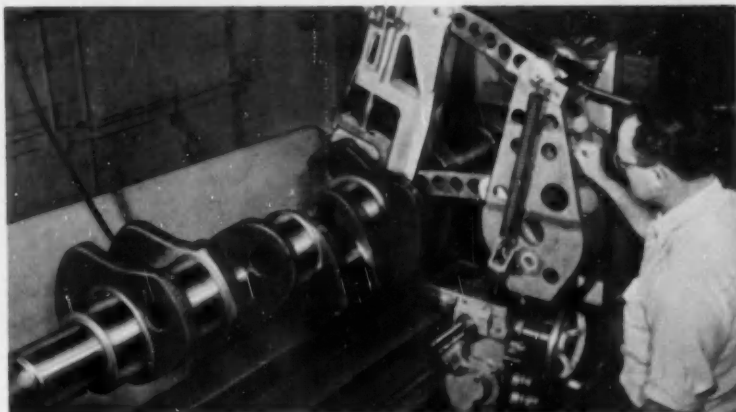
See new Ram Type models, including the 4½" spindle bore No. 5. Also, first showing of the new Electram for high-speed, automatic operation on small parts.

HOW TO SUPERFINISH CRANKSHAFT BEARINGS ON A LATHE

No. 4 attachment makes possible smoother surfaces with very small investment

Even on limited production, you can take advantage of the benefits of Superfinishing. Attachments can be mounted on your own lathe, thus saving the cost of a special machine. In this case, large diesel engine crankshafts, main and pin bearings are Superfinished in one operation. Costs are held low by a Superfinishing attachment with a special latch-on type, follower-arm.

Nine bearing surfaces are Superfinished with four minutes stone contact time per bearing and one minute to position the attachment for the next bearing. A final surface finish of 3 to 5 micro-inches R.M.S. is attained, compared to 25 to 30 micro-inches R.M.S. before Superfinishing.



This special Superfinishing attachment on existing equipment eliminates polishing and lapping operations to insure better crankshaft performance.

AT THE SHOW:

SUPERFINISHERS—machines working continuous runs and job lots. Demonstrations to show reasons for Superfinish and how to control size.

TALK TO GISHOLT ABOUT MACHINE TOOL LEASING





TIME-
SAVING
IDEAS

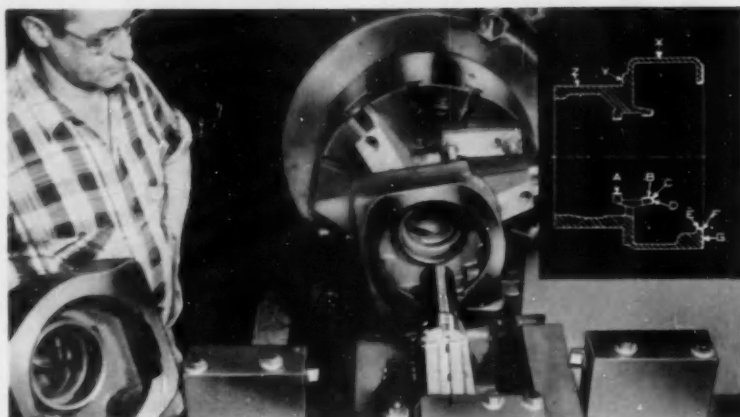
AWKWARD GEAR HOUSINGS HANDLED EASILY THROUGH SMART TOOLING

*Simplimatic setup with
9 tools, bores three
diameters simultaneously*

The manufacturer of a well-known farm tractor line had a problem in machining the awkward cast iron gear housing you see here. Smart tooling and the Gisholt Simplimatic Automatic Lathe are proving the answer.

The operator sets the rough work-piece on a special angle plate bracket providing a loading rest. This bracket also serves as a work-driver. Work is then placed against jacks at "Y" and chucked on the long hub at "Z" in a 3-jaw air chuck.

The center slide carries a piloted boring head. This is used for rough and finish boring "A," "B" and "E" as well as chamfering "C" and "F" and facing "D." When this work is completed, the head holds up while front and rear slides rough and finish face "G." This provides complete concentricity for all surfaces and



gives excellent finishes free of tool interference.

Through the speed and economy of operation provided by the Simplimatic Automatic Lathe, floor-to-floor time on this job is only 3.4 minutes. Fourteen pieces are produced per hour, with 80% efficiency.

Three diameters are bored simultaneously in awkward workpieces by combining careful tooling with the versatile Simplimatic.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★
★
★ **AT THE SHOW:** ★
★
★ **SIMPLIMATICS**—50 h.p. machine on bevel gear blanks. Many new machine features include greater spindle speeds and automatic lubrication to the slides. ★
★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

BALANCER HAS WELDING UNIT FOR ON-THE-SPOT CORRECTIONS

*High Production Setup for
Balancing Automotive Flywheels*

You know the speed, efficiency and accuracy of manufacturing operations demanded by the automotive industry. Here's how vital balancing of automotive flywheels measures up to these requirements. This Gisholt ISV1 Static Balancer measures, corrects and inspects these flywheels at a rate of 36 seconds per part.

It's a simple operation. As the flywheel is rotated, the Amount Meter tells the operator exactly how many correction lugs are needed. The strobe lamp, flashing on the numbered dial below the part, indicates where they are to go.

Welding equipment, mounted right

on the machine, permits correcting the parts for balance in a single handling. The operator places the correction lug against the upper electrode of the welding gun where it is held magnetically until applied at the indicated angle. Then, a quick check to assure the part is within the prescribed tolerance—and the operation is completed.

Maximum efficiency and accuracy are attained by combining measurement, correction and inspection for balance in a single, fast operation.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★
★
★ **AT THE SHOW:** ★
★
★ **BALANCERS**—See actual production runs and demonstrations. Bench, vertical and large-capacity machines in use on static and dynamic balancing jobs. ★
★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★



Correction equipment—either by addition of weight such as operator indicates here, or by weight removal, can be incorporated by any Gisholt Balancing Machine. New Type 5 catalog, Form #1165, gives complete details.

No. 7-855
640



THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT

MACHINE COMPANY

Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES



THE SLEEK NEW USAF MARTIN B-57 TACTICAL BOMBER IS EQUIPPED WITH THE ARO 5 LITER LIQUID OXYGEN CONVERTER

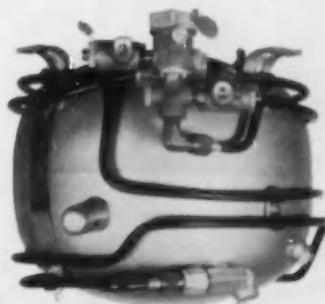
ARO *Vision-eering*

LEADS THE WORLD IN OXYGEN EQUIPMENT

Another ARO FIRST! The new 5, 8 and 20 Liter Liquid Oxygen Converters developed by ARO trim the space-and-weight load in fighters and bombers . . . for example, crew oxygen increases by 75 % over equivalent gaseous oxygen supply at no expense in weight. Complete technical and engineering data available on request.

This is typical of many ARO contributions to aviation progress . . . with world leadership in the design, development and manufacture of oxygen equipment. Leading aircraft builders today depend on Aro for a growing number of precision products. For further details write:

THE ARO EQUIPMENT CORP. • BRYAN AND CLEVELAND, OHIO
Aro Equipment of California, Los Angeles, Calif.
Aro Equipment of Canada, Ltd., Toronto 15, Ontario
Offices in All Principal Cities

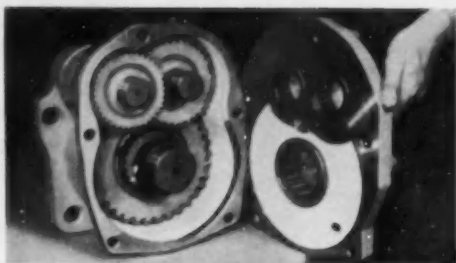


ARO

AIRCRAFT PRODUCTS

Liquid Oxygen Converters, Oxygen Regulators, Pressure Regulators, Contents Gauges, Relief Valves "Anti-G" Valves, Air and Oxygen System Accessories, Actuating Cylinders, and other Aircraft Accessories.

How you can put hundreds of



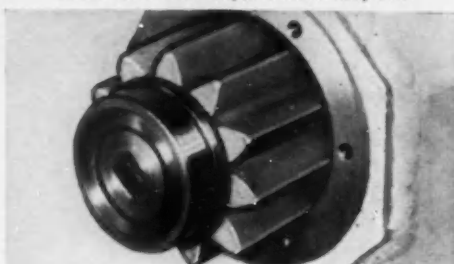
Gear Box Gears—Republic 4320H and 4820H Alloy Steels



Transfer Case Pinion—Republic 4820H Alloy Steel



Transfer Case Ring Gear—Republic 4820H Alloy Steel



Final Drive Pinion—Republic 4820H Alloy Steel



horsepower to work with safety

LeTourneau-Westinghouse does it with the help of Republic Alloy Steels on the Model B Tournapull. This high-speed, self-propelled scraper is designed to carry 23 yards of earth at speeds up to 28 miles per hour.

Republic Alloy Steels are used in this giant for final drive pinions, transfer case ring gear and pinion, gear reduction box gears and pinions, and electric motor pinions.

Alloy steels provide an outstanding combination of qualities essential to safety in designing equipment to carry heavier loads at higher speeds. In these fine steels you will find highest strength values—plus an unusually high strength-to-weight

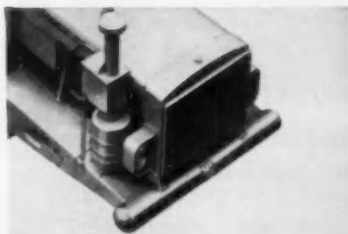
ratio that permits transmission of hundreds of horsepower through tough, strong gears and shafts free from excessive weight.

And when you add to these qualities uniform hardness, that means reduced wear—plus resistance to fatigue, shock, stress and temperature extremes—you have a material with the ability to insure safety, extend equipment life, and to cut maintenance and replacement costs.

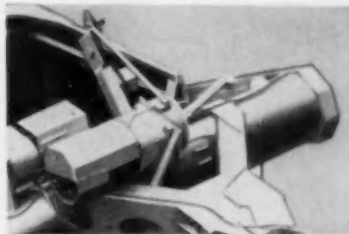
Republic—world's largest producer of alloy steels—is ready to assist you with metallurgical and engineering assistance in the most efficient and economical application of these fine steels to your product. The coupon will bring you more information.

REPUBLIC STEEL

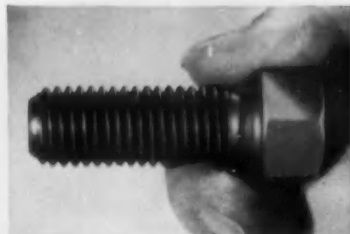
World's Widest Range of Standard Steels and Steel Products



ANOTHER REPUBLIC PRODUCT, Electric Resistance Weld Steel Pipe, is used for the front bumper on the Model B Tournapull. Both this type and Continuous Butt Weld Steel Pipe have been serving industry for years in all types of applications. Today they are better than ever. They have many mechanical applications, like the one shown above, in addition to being used for transmission of gas, water, steam.



PINS, BRACES AND REINFORCEMENTS on the Model B Tournapull are made from Republic Hot Rolled Carbon Bars. Countless forging and general manufacturing companies look to Republic as a dependable source for hot rolled steel bars. Rounds, squares, hexagons, octagons and flats are produced in all grades of carbon, alloy and stainless steels. Republic also supplies hot rolled special sections for economical mass production of steel parts.



REPUBLIC COLD FINISHED CARBON BARS are used by LeTourneau-Westinghouse for cap screws and bolts. Cold drawing gives steel parts higher strength, greater uniformity and a bright, smooth finish. Republic's Union Drawn Division supplies high-quality cold finished bars in all standard and special carbon, alloy and stainless analyses. And to get the most out of these steels, Republic offers you the services of expert metallurgists and machining specialists.



REPUBLIC STEEL CORPORATION
3106 East 45th Street
Cleveland 27, Ohio



Please send more information on:

- | | |
|---|--|
| <input type="checkbox"/> Alloy Steels | <input type="checkbox"/> Steel Pipe |
| <input type="checkbox"/> Cold Finished Bars | <input type="checkbox"/> Hot Rolled Bars |

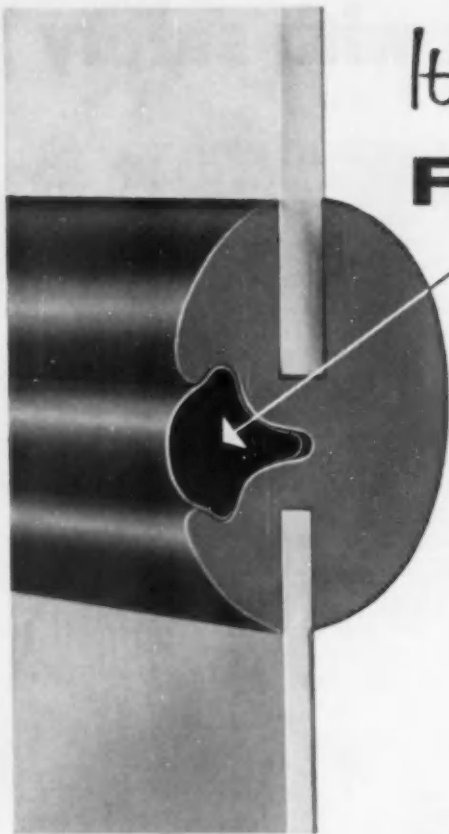
Name _____ Title _____

Company _____

Address _____

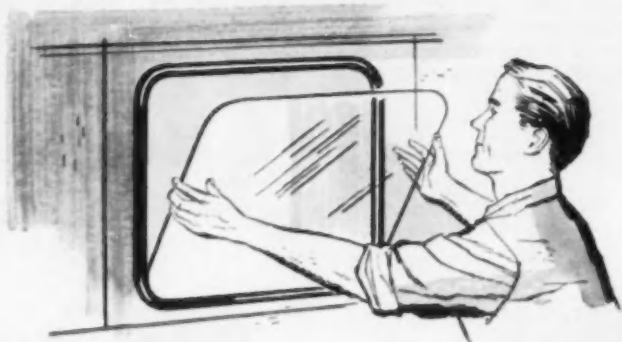
City _____ Zone _____ State _____

K-2007



It's this separate **FILLER STRIP**

**that allows fast, easy
replacement... in the shops
... on the road!**



**The filler strip makes possible these
other Inland advantages!**

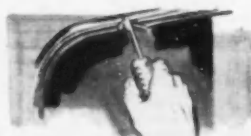
Only Inland Self-Sealing Weather Strip has this patented filler strip. Inland Weather Strip can be installed easily and quickly. Shop time for vehicles is slashed—because with Inland Weather Strip, windows are replaced on the spot in just a few minutes. Broken glass can even be replaced on the road, if necessary.

With Inland Weather Strip, you need make no provisions whatsoever for cement, clamps, moldings or channels. The Filler Strip enables the installer to compress the sealing strip *after* the glass is in place. No more headaches from trying to force the glass into a compressed groove.

INLAND MANUFACTURING DIVISION
General Motors Corporation • Dayton, Ohio



LEAK PROOF! Permanently leak proof, because it seals both glass and body panel under powerful compression.



A POSITIVE SEAL! This filler strip puts more pressure on the fence and the glass—assures complete, positive weather proofing every time.



FREEDOM OF DESIGN! No provision need be made for moldings, channels, binder strips or cement when designing with Inland Self-Sealing Weather Strip.



VERSATILITY! Ideal for vehicles, booths, trains, gasoline pumps, buildings, marina windows—for positive, permanent sealing of any window or panel!

Self-Sealing (PATENTED) **WEATHER STRIP**

Why limit yourself to "STOCK" sizes?

Hannifin can ship the cylinder you need within 48 hours!

(NEW AND EXPANDED PRODUCTION FACILITIES MAKE THIS POSSIBLE)

Any mounting style in:

Series "A" Square Head Air Cylinders—1½" to 14" bore

Series "H" Square Head Hydraulic Cylinders—1½" to 8" bore

Series "LW" Cast Head Air Cylinders—1" to 12" bore

Strokes

As specified to 60"

Rod Ends

Catalog standards, including standard alternates.
Most special rod ends require only 24 hours longer.

Cushions

Either or both ends if required

Quantity

Normally any quantity you need for rush jobs.
For large quantities specify your requirements.



order by phone

When the need is urgent
call long distance.
Experienced sales engineers
will handle your order

CALL HANNIFIN CYLINDER SALES
Des Plaines Number—Vanderbilt 4-0151
From Chicago Phones Only—ROdney 3-4000

Do you have these two
newest Hannifin catalogs?

BULLETIN 113—
Series "H"
Hydraulic Cylinders
BULLETIN 313—
Series "A"
Air Power Cylinders

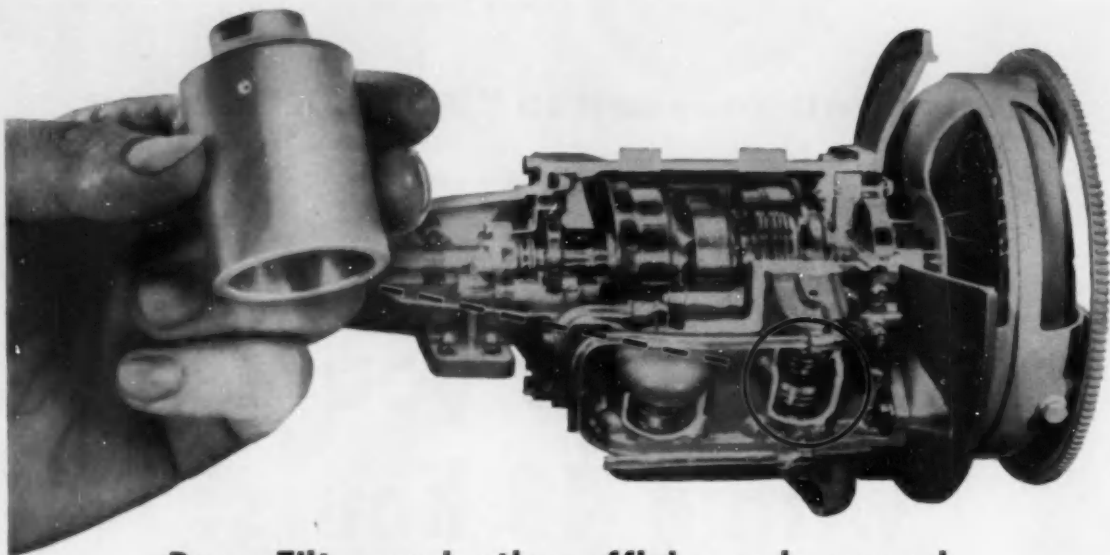
Write for your copies



HANNIFIN

Hannifin Corporation, 543 S. Wolf Road, Des Plaines, Ill.

Air and Hydraulic Cylinders • Hydraulic Power Units • Pneumatic and Hydraulic Presses • Air Control Valves



PowerFlite production efficiency increased using Alcoa Aluminum Impacts

The reverse servo piston sleeve of Chrysler's PowerFlite transmission used to be machined from bar steel. Chrysler engineers felt that this part might be made more efficiently as an aluminum impact extrusion without sacrificing quality.

Alcoa specialists, working closely with Chrysler engineers, determined the design modifications to permit making the part by impact extrusion. Within six months, the first Alcoa® Aluminum impact-extruded sleeves were going into PowerFlite transmissions. Result? These parts are now impacted to near-final dimensions in a fraction of a second, with the number of machining operations substantially reduced.*

For full information on impacts, call in your local Alcoa sales engineer. Aluminum Company of America, 1841-G Alcoa Building, Pittsburgh 19, Pa.

**The same production benefits Chrysler got from the transmission part, they also obtain from such Alcoa Impacts as spark plug tubes and lower housing covers for hydraulic steering assembly.*

When Should You Look Hard at Alcoa Impacts?

Much recent progress has been made by Alcoa in impact extrusion. Now—look at Alcoa Impacts when you want:

- Parts as long as 18 inches
- Parts weighing up to 10 pounds
- Tensiles up to 75,000 psi
- Surface finishes of 40 to 250 microinches
- Length-to-diameter ratios as high as 12 to 1

Your Guide to Aluminum Value



Diamond ring for a diesel



CROSS SECTION

ELIMINATES INJECTION NOZZLE LEAKS

Crankcase dilution can be a big headache. But not for one of the leading Diesel manufacturers. They knew that the right injection nozzle seal would cure a major cause . . . and came to C/R Sirvene engineers for help. C/R manufactured this Sirvene (synthetic rubber) part to extremely critical dimensions and physical properties to match the equally precise dimensions of the assembly. Result: no more leakage. When you need a unique pliable part, produced with precision quality, you need C/R Sirvene. Write us for your copy of "Engineering with Sirvene."



CHICAGO RAWHIDE MANUFACTURING COMPANY

1301 Belden Avenue SIRVENE DIVISION Chicago 22, Illinois

IN CANADA: MANUFACTURED AND DISTRIBUTED BY SUPER OIL SEAL MFG. CO., LTD., HAMILTON, ONT.

Other C/R products

OIL SEALS: Shaft and end face seals for all types of lubricant retention and dirt exclusion • CONPOR: Controlled porosity mechanical leather packings and other sealing products • SIRVIS: Mechanical leather boots, gaskets, packings and related products.

This is a fast

Every hour, this Newton Vertical Rotary roughs and finish mills the tops of 600 aluminum pistons at 85% efficiency.

The machine automatically clamps, unclamps and ejects the finished pistons onto a conveyor. All the operator does is load!

A Newton Vertical Rotary is more than a machine tool—it is a method—the fastest known method of milling the flat surfaces of repetitive pieces!



CONSOLIDATED MACHINE TOOL

A DIVISION OF FARREL

one!



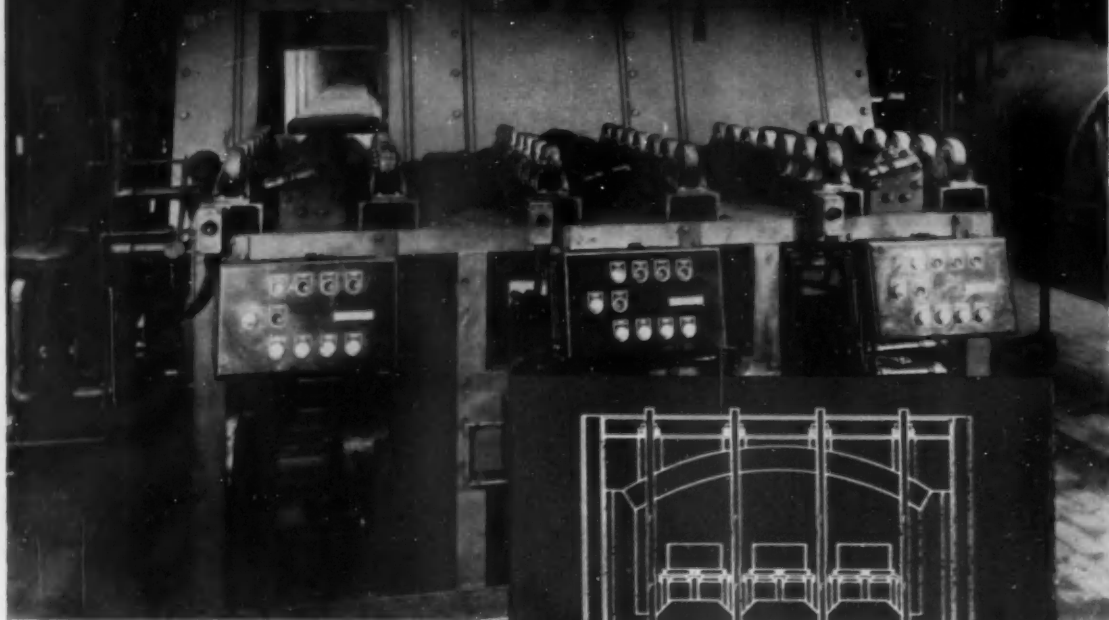
■ For aluminum milling, Newton Vertical Rotaries have high speed Vee belt drives and feeds up to 100 inches per minute.

COMPANY, ROCHESTER 10, N. Y.

BIRMINGHAM CO., INC.



Heavy case depth held within .002" uniformity



This three-row pusher-type carburizing furnace provides maximum heat uniformity through use of Lindberg vertical radiant tubes installed between each row as well as at side walls, providing accurate control of case depth and properties.

New Efficiency in Carburizing With Lindberg Vertical Radiant Tubes

This highly efficient furnace with Lindberg vertical radiant tubes carburizes 650 lbs. of gears per hour with an effective case of .055". Case depth is held within .002" uniformity. Gears range up to a maximum diameter of 15" and 30 lb. weight. In this operation, furnace is adjusted to .80% carbon but can be set to control content of the case at any level desired.

Furnace rows are equipped with five zones of control, Zones 1, 2 and 3 operating at 1700° F. for carburizing. In Zone 4, at 1700° F. for diffusion, atmosphere is adjusted to the carbon content specified for the case. In Zone 5, temperature drops to 1500° F. for quenching.

An endothermic carrier gas atmosphere enriched with a hydrocarbon gas is used and gears are Gleason Press quenched.



The Lindberg vertical radiant tube used in this installation weighs only 36 lbs., is only 84" long. Can be changed easily in a few minutes.

Exclusive "dimple" design insures uniform heat over designated length of tube.

Special green silicone enamel coating resists carburization and lengthens tube life.

For any type of industrial heating or processing operation, Lindberg provides a complete analyzing, designing and construction service including completed installation in your own plant. To get immediate, on-the-spot service from an expert Lindberg engineer call your nearest Lindberg Field Office (see classified section of your telephone book) or write us direct.

LINDBERG

L
INDUSTRIAL

INDUSTRIAL CORPORATION

Specialists in Field-erected Equipment

Chicago Plant: 2321 West Hubbard Street, Chicago, Illinois
Los Angeles Plant: 11937 Regentview Ave. at Downey, Calif.



**air-
conditioned
cover
keeps
new
clutch
c-o-o-l**

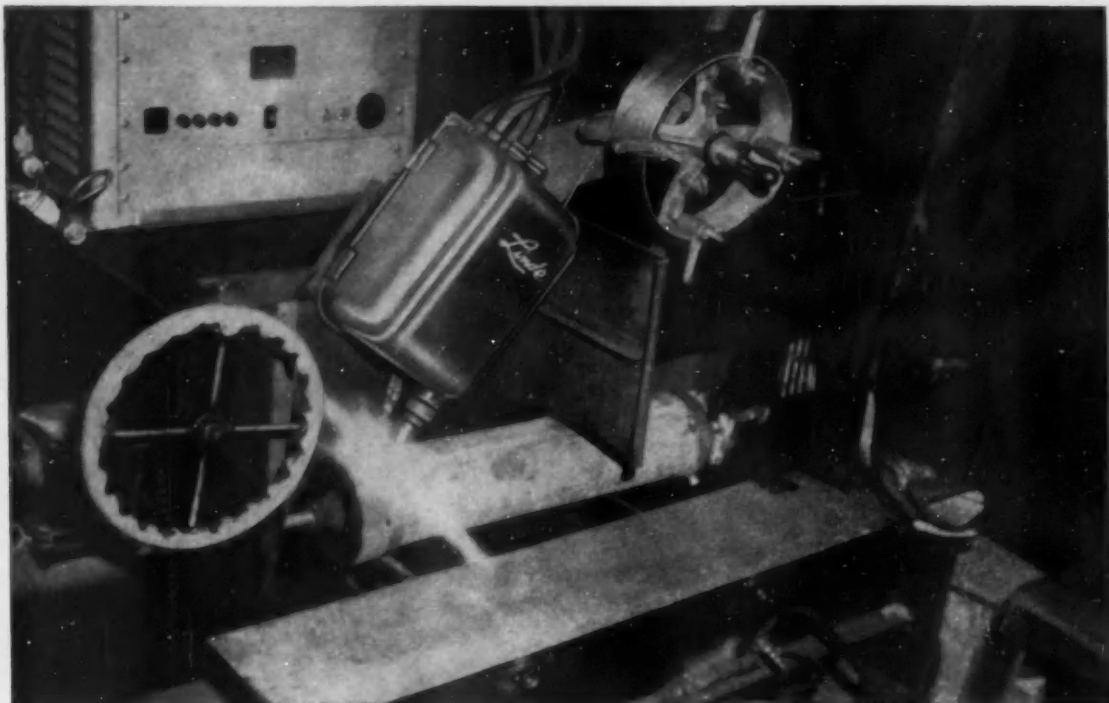
Frictional heat has little effect on the new Lipe Direct Pressure Clutch. Air circulating through the cover's 33 ventilating holes dissipates heat rapidly. The result is a heavy-duty clutch singularly free of burned facings and warped pressure plates. A clutch whose low maintenance cost matches its low first cost.

Lipe Direct Pressure Clutches now available: 13", 14", 15" single-plate, 14" and 15" two-plate. Send for complete information.

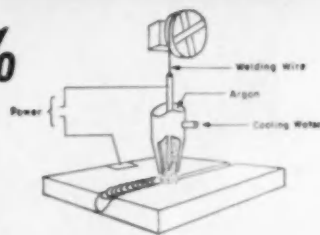
Manufacturers of Automotive Clutches & Machine Tools



Lipe-ROLLWAY
CORPORATION
SYRACUSE 1, N. Y.



Sigma Welding...Cuts Costs 36% Ups Steel Fabrication 93%



By shifting from manual arc welding to mechanized sigma welding, production of 31-in. long, 11-ga. steel condensers was almost doubled—costs were cut over a third—and unit quality greatly improved. These sigma welded condensers have been tested to hydrostatic pressures of 2,800 lb. per sq. in. with no sign of failure.

All completed condensers are subject to an air pressure test under water, and a supersensitive electronic leak detector . . . Rejects have been practically eliminated by sigma welding. Like many other products throughout industry, these condensers are being fabricated faster and more economically than ever before. Here are some

sigma welding features—

- Uses any standard d.c. or constant potential power supply. With c.p., no control is necessary to maintain constant arc voltage, starting is faster and operations more efficient.
- Makes smooth welds in all type joints—on all commercially fabricated metals.
- Welding speeds exceed 100-in. per minute in many operations . . . And sigma welding joins metals up to 1/4-in. thick in one pass. Start saving now, call your local LINDE representative for more information—and ask for Form 7942 "Modern Methods of Joining Metals."

Linde Air Products Company

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street **UCC** New York 17, N. Y.

Offices in Other Principal Cities

In Canada: LINDE AIR PRODUCTS COMPANY
Division of Union Carbide Canada Limited, Toronto
(formerly Dominion Oxygen Company)

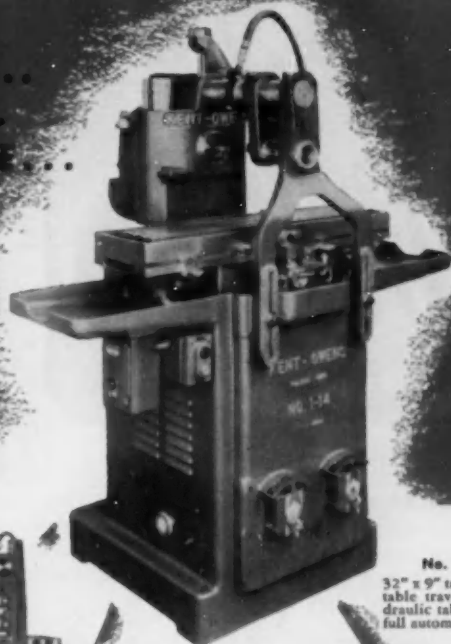
The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.



EXTRA

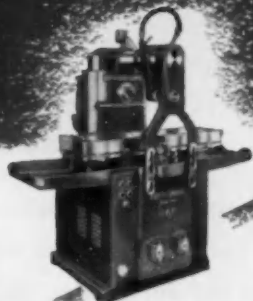
**RUGGED...
SPEEDY...
ACCURATE...**

to Bring Down Milling Costs!



No. 1-14

32" x 9" table ... 14" table travel ... hydraulic table feed ... full automatic cycle.



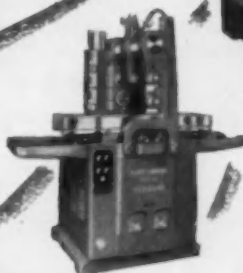
No. 2-20

20" table travel... 42" x 12" table... fully automatic hydraulic table feed.



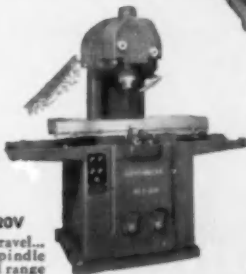
No. 1-14DS

Double Spindle for two milling operations at same time ... 14" table travel ... 32" x 9" table.



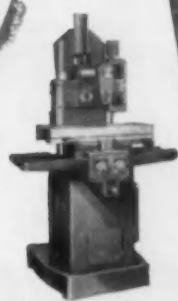
No. 2-20DS

Double Spindle for two milling operations at same time ... 20" table travel ... 42" x 12" table.



No. 2-20V

20" table travel... vertical spindle with speed range 32 to 1284 R.P.M. ... 42" x 12" table.



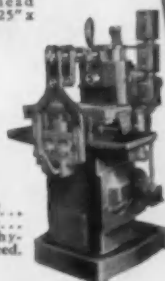
No. 1-V

Hydraulic vertical head feed ... 5 1/2" head travel ... 25" x 9" table.



No. 1-M

Hand feed to table and head ... 25" x 9" table ... Adjustable head counter-balance.



No. 1-8

8" table travel ... 25" x 9" table ... automatic hydraulic table feed.

STEP UP SPEED and ACCURACY!

Put the work on Kent-Owens Machines for top-speed milling and topmost accuracy to keep your costs at a minimum! Advanced features throughout these rugged machines make the difference ... greater dependability ... accuracy maintained in meeting tough production schedules. Twin-post head mounting assures balanced load. Greater cutting efficiency—only two gear contacts, motor to spindle. Write for bulletin #754 on wide range of hydraulic and hand-operated machines. Also, let Kent-Owens design and build your tooling and special machines. Kent-Owens Machine Co., Toledo, O.

KENT-OWENS

for milling machines

KENT-OWENS REPRESENTATIVES

BOSTON General Machinery Corp.	HAMILTON, ONT. F. J. Barber Mach. Co.	MILWAUKEE Four Sons Mach. Co.	PITTSBURGH Barnes Machinery Company
BUFFALO Dow W. Parsons	HOUSTON Hartman Machinery, Inc.	MINNEAPOLIS The Superior Company	ROCHESTER F. W. Schuler Machinery Co.
CHICAGO Four Sons Mach. Co.	INDIANAPOLIS Dunn Machinery Co.	MONTREAL F. F. Barber Mach. Co.	SAN FRANCISCO C. F. Bates Machinery Co.
DALLAS Hosner Machine Tool Co.	KANSAS CITY Eckman Machinery Co.	NEW ORLEANS Oliver B. Van Horn Co., Inc.	ST. LOUIS Bryant & Thayer Mach. Co.
DAYTON C. H. Genger Mach. Co.	LOS ANGELES Shelton Machinery	NEW YORK Harrington-Wilson Brown Company	TOLEDO, OHIO F. F. Barber Mach. Co.
DETROIT A. C. Hallock Mach. Co.	PHILADELPHIA Cotton Machinery Company		
FT. WAYNE Cotton Machinery Co.			
GRAND RAPIDS Joseph H. Hanchan			

Bendix Products Division

A good reliable source

FOR AUTOMOTIVE COMPONENTS

Because of long experience, serving
many customers,

Bendix Products Division can apply
much of the combined know-how
of the automotive industry

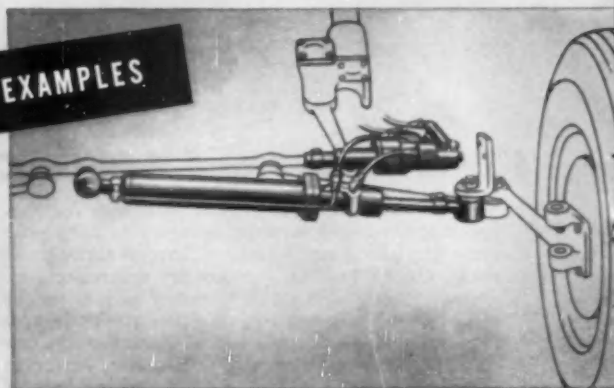
to any specific project
in the design and manufacture of
automotive components.



TYPICAL EXAMPLES



BENDIX LOW PEDAL POWER BRAKE—Specified by more car manufacturers than any other make, Bendix® Low Pedal Power Brake makes possible quick, sure stops by merely pivoting the foot from the go to the stop control. No need to lift the foot and exert leg power to bring the car to a stop. Result—more driving comfort, less fatigue and greater safety!



BENDIX LINKAGE TYPE POWER STEERING—Because Bendix® Power Steering is of the linkage type, manufacturers find it especially adaptable for production line installation without extensive engineering changes. Manufacturers can now meet the ever-increasing demand for power steering more efficiently and more economically with Bendix Linkage Type Power Steering.

*REG. U.S. PAT. OFF.

BRAKES • POWER STEERING • POWER BRAKING • CONSTANT VELOCITY UNIVERSAL JOINTS • HYDRAULIC REMOTE CONTROLS

BENDIX PRODUCTS DIVISION SOUTH BEND INDIANA

Export Sales: Bendix International Division, 205 East 42nd Street, New York 17, N. Y.

Bendix
AVIATION CORPORATION

AUTOMOTIVE INDUSTRIES

BUSINESS DEPARTMENT

Jack C. Hildreth, Publisher
John F. Pfeffer, Asst. to Publisher
E. H. Miller, Advertising Mgr.
E. W. Hevner, Circulation Mgr.
John R. Flood, Market Research
 Chestnut and 56th Sts.
 Philadelphia 39, Pa.
 Phone GRanite 4-5600

REGIONAL MANAGERS

CHICAGO—**John T. Hoole**
 916 London Guarantee
 and Accident Building
 Chicago 1, Ill.
 Phone FRanklin 2-4243

DETROIT—**Melvin B. Nylund**
 1015 Stephenson Bldg.
 Detroit 2, Mich.
 Phone TRinity 5-2090

PHILADELPHIA and NEW YORK—
Nelson W. Sieber
 Chestnut and 56th Sts.
 Philadelphia 39, Pa.
 Phone GRanite 4-5400
 and
 100 East 42nd St.
 New York 17, N. Y.
 Phone OXford 7-3400

CLEVELAND—**Richard P. Keine**
 730 National City Bank Bldg.
 Cleveland 14, Ohio
 Phone CHerry 1-4188

SAN FRANCISCO—
R. J. Birch and Frank W. McKenzie
 300 Montgomery St.
 San Francisco 4, Calif.
 Phone DOuglas 2-4393

LOS ANGELES—**L. H. Jackson**
 3156 Wilshire Blvd.
 Los Angeles 5, Calif.
 Phone DUmkirk 7-2119

One of the Publications
 Owned by

① **CHILTON CO. (INC.)** ①

Executive Offices
 Chestnut & 56th Sts.
 Philadelphia 39, Pa., U.S.A.

Officers and Directors

JOSEPH S. HILDRETH, Chairman of the Board

G. C. BUZBY, President

Vice Presidents

P. M. FAHRENDORF

HARRY V. DUFFY

Treasurer—**WILLIAM H. VALLAR**

Secretary—**JOHN BLAIR MOFFETT**

GEORGE T. HOOK

MAURICE E. COX

TOM C. CAMPBELL

FRANK P. TIGHE

L. V. ROWLANDS

ROBERT E. McKENNA

IRVING E. HAND

EVERETT B. TERHUNE, JR.

J. C. HILDRETH, JR.

RUSSELL W. CASE, JR.

High Spots of This Issue

Automatic Machines Used for Ford Tractor Production

Continuing his study of the expanded facilities for the output of the 1955 Ford tractor line, the author reviews here a multiplicity of machines and their operations. General layout of the plant is also described in this article. See Page 52.

French Aircraft Industry Regains Former Status

Readily apparent in the displays of planes and equipment at the recent French Aero Salon was the revitalization of the French aircraft industry. Many other nations participated in the event also, and their exhibits are reported too. Page 56.

Marbond Process Cuts Weight Without Strength Loss

After a long period of study and experimentation, Glenn Martin Co. developed the Marbond process for bonding. Now widely used for a large variety of aircraft components, the techniques involved are well explained. Page 62.

Auto-Lite's Expanded Bumper Plant

Recently enlarged and modernized to the tune of about \$82 million, the Auto-Lite bumper plant in Sharonville, O., is all set for higher-volume production. In addition to that relocated, much new equipment has been installed. Page 70.

U. S. Type Tools Used in Canadian Engine Plant

Remarkably comparable in modernity to the newest American plants, the McKinnon Industries, Ltd., facilities in St. Catharines, Ont., are designed to turn out 35 V-8 engines per hour. Presented here is a tour of the plant. Page 74.

42 New Product Items

And Other High Spots, Such As:

Mechanized line; electrostatic spray;
 Torqmatic transmission; Le Mans
 cars; wind tunnel; plastic truck body;
 and engine combustion processes.



Complete Table of Contents, Page 3
 Automotive and Aviation News, Page 37

AUTOMOTIVE INDUSTRIES COVERS
 PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES
 • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY •
 PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT
 SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
 ENGINEERING • PRODUCTION • MANAGEMENT

Let's take a



new look

at quality control

One of the great ideas in steel supply has been taking on new meaning at Ryerson lately—and it will be worth your while to learn about it.

Twenty years ago, the Ryerson plan for Certified Steel was big news because it set standards of quality unequalled in steel from stock at that time. But during the postwar period of great demand, emphasis on quality necessarily gave way a little to emphasis on quantity until additional capacity could be built.

Today, however, there's no compromise! A committee of top Ryerson executives has instituted a sweeping new program of checks and counter-checks. Specifications have been rewritten; inspection techniques tightened; so that today *Certified Steel* means more than ever before. For example, it means that:

- every kind of steel in Ryerson stocks—carbon steel, alloy steel and stainless—is produced to definite specifications for high uniform quality.
- you are protected against the possibility of mixed steels by our spark testing of carbon steel plates and special quality bars, structurals, alloys and stainless bars and plates.

— the specific heat analysis is available for all Ryerson plate steel, special quality carbon bar steel, alloy steel and stainless steel because all are identified by heat number and every heat analysis is kept on file.

— you can use Ryerson alloy steel with complete confidence because a practical 8-step quality-control plan assures dependable performance and guides heat treatment.

— on *all* Ryerson Certified Steels we are able to furnish a certificate of analysis.

Certified Steel means all these things and many more. Its essence is a devotion to quality that has an increasing dollars-and-cents importance to you. The world's largest steel stocks are also the world's finest—backed by over a century of reliability in product and service. Today, more than ever before, you can depend on Ryerson as your best source for the steel you need, when you need it.

RYERSON STEEL

In stock: Carbon, alloy and stainless steel . . . bars, structurals, plates, sheets, tubing, reinforcing bars, machinery & tools, etc.

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI • CLEVELAND
DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 113, No. 2

July 15, 1955

Mercury to Build Calif. Plant; Chicago Stamping Plant Planned

Ford Motor Co. is moving ahead rapidly with its \$625 million new expansion program, announced earlier this year. Latest projects include a \$50 million plant for the Mercury Div. near Los Angeles to meet the growing market in California and the entire Western area, and a 1.5 million sq ft stamping plant south of Chicago.

The Mercury plant, to be located on a 200-acre site in Maywood, Calif., is expected to be in operation within two years. Mercury has been operating another plant about four miles from the new site since 1948. The Los Angeles unit is the fifth plant to be built by Mercury since the end of WW II.

The new stamping plant will be located in Chicago Heights and will be operated by Ford's Metal Stamping Div. Situated on a 140-acre site, the plant reportedly will contain 16 major press lines.

Rubber and Glass Fibers Combined in Novel Tire

U. S. Rubber Co. has developed jointly with Dow Corning Corp. a new type of tire that is said to withstand temperatures ranging from -90 F to +500 F. Designed for highly specialized use, it is the first tire combining silicone rubber and glass fibers.

Application of the experimental tire to automotive vehicles is unlikely at present due to high cost for materials. The company believes, however, that this type of tire may be especially suitable for high-speed, supersonic aircraft which are exposed to temperatures as high as 500 F.

The glass fibers and bead wires are specially coated with a silicon adhesive, while the ply skimcoating, treads and sidewalls are made of Silastic, the Dow Corning silicone rubber. The casing is molded in a conventional tubeless tire mold.

ITALIAN CAR OF ALL USES

The Giulietta passenger car is an Alfa Romeo automobile designed for everyday use. Powered by a four-cylinder engine with an output of 50 bhp at 5200 rpm, it has a wheelbase of seven ft, nine in., and is approximately 12 ft long and five ft wide overall.



Chrysler, Universal Products Involved in Merger Proposal

Latest merger talks involve Chrysler Corp. and Universal Products Co., Dearborn, Mich., supply concern. Chrysler reportedly is seeking to purchase the latter to further strengthen its competitive position, and admits there have been some negotiations with the Universal, although no decision has been reached yet.

Chrysler has been Universal's biggest customer. If Chrysler acquires the company, it would give the car maker its own source for universal joints, propeller shafts, and steering column jackets.

Thompson, Ramo-Wooldridge Joining in Financial Pact

Thompson Products, Inc., will make available up to \$20 million to its affiliate, Ramo-Wooldridge Corp., to finance the latter's expansion program. Under the agreement between the two companies, the money will be furnished through the sale of preferred stock and long-term revolving credit.

The agreement provides Thompson with option rights, which, in the future, could increase its interest in Ramo-Wooldridge to 84 per cent. At

present, majority ownership and control of Ramo-Wooldridge is in the hands of its key employees.

Ramo-Wooldridge at present has two new buildings under construction, and plans already have been formulated for a manufacturing plant in the midwest. The plants will be used for expanded work on automation devices, electronic computers, guided missiles, transistors, and other commercial and military products.

Ford to Sell Former Plant Located at Richmond, Calif.

Ford has decided to sell its 25-year-old assembly plant in Richmond, Calif. Located on a 60-acre site, the plant originally was valued at more than \$3 million. The company recently transferred all operations from that plant to a new \$40 million assembly unit near San Jose, where operations got underway in February.

Continental Motors Nets \$1.4 Million in Period

Net earnings of Continental Motors Corp. in the six months ended April 30 totaled \$1.44 million. Sales for the period were \$78.3 million.

News of the AUTOMOTIVE



NAVY FIGHTER IS LIGHTENED BY TITANIUM

Striking over the California desert on a test flight is Chance Vought Aircraft's sleek new XF8U-1 Navy day fighter. Designed to operate from aircraft carriers at supersonic speeds, the fighter uses titanium in the aft-section and part of the mid-section to save weight. Power plant is the Pratt & Whitney J-57-P-4 turbojet with afterburner.

United Press

Fifth GM Stock Split, Employee Savings Plan Readied

A three-for-one stock split has been proposed by General Motors directors. To be given to stockholders for approval at a special meeting Sept. 23 at Wilmington, Del., the proposal is designed to achieve wider distribution of the nearly 92 million shares of stock outstanding.

Simultaneous with the stock-split proposal, GM revealed a savings-stock purchase plan for salaried employees. The plan is similar to Ford's recently announced proposal to issue stock to its salaried employees at a reduced price when it is placed on the market. The GM savings-stock purchase plan will also be voted on at Delaware meeting.

While GM did not indicate what the future dividends policy would be under the proposed three-for-one split, it is expected that these would be increased. GM's major stockholder, E. I. du Pont de Nemours & Co., would increase the number of shares it holds from 21 million to 63 million under the new plan. GM has been paying a dividend each quarter.

Under the employee investment plan, GM will contribute fifty cents for each one dollar invested by the employee. It is estimated that an investment of \$300 by an employee in one year could yield more than \$450 in five years under favorable market conditions. More than 100,000 GM em-

ployees would be eligible to participate in the program.

Employees would be permitted to contribute up to 10 per cent of their salaries into the plan. Half of the amount would be invested in U. S. Government bonds, while the other half would go for common stock. The GM contribution would be invested entirely in company common stock.

The program would include two parts—a savings fund plan and a retirement thrift plan. Classes under each plan would be formed every year, and the employee would have a choice by the end of the year of determining which plan he would want to invest in that year.

Under the savings plan, classes would mature at the end of the fifth year after they are formed, at which time the employee would get a full settlement. Classes under the retirement thrift plan would not mature until retirement or earlier termination of the employee's services.

GM has split its stock five times in 35 years, including one reverse split. The last split was in 1950, when two shares were issued for each one held. Other stock splits occurred in 1929, when the corporation issued 2.5 shares for each one held; in 1927, two for one; in 1924, one for each four held in a reverse split; and in 1920, when shareholders got 10 shares for one.

Lincoln 1955 Model Output Ends With Total of 27,222 Vehicles

Another indication of earlier announcement dates for 1956 cars is given by Lincoln Div. of Ford Motor Co., which turned out its final 1955 model last month (June). The division produced a total of 27,222 units, compared with 35,945 of the 1954 models.

The lower output resulted from a shorter production run, which lasted only eight months, compared with 11½ months for the 1954 models. Date for introduction of the 1956 Lincoln models has not been announced officially, but it might well be in September.

20 Millionth V-8 Engine Is Turned Out By Ford

Ford last month (June) turned out its 20 millionth V-8 engine, which it claims is more than the combined production of such engines by the rest of the industry. Introduced to the high-volume automotive field in 1932, Ford's first V-8 was rated at 65 horsepower.

The company at present is turning out V-8 engines at four plants—two in Cleveland and two in Dearborn. A fifth V-8 engine facility is now under construction at Lima, O.

Nash Adds 48 More Outlets To Its Dealer Organization

Nash has added 48 more car dealers to its organization. The latest group, signed up in June, brings to 340 the total number of sales outlets Nash has taken on since January. The total includes 40 dealers in January, 100 in February, 57 in March, 51 in April, and 44 in May.

General Named By Willys To Government Sales Unit

Willys continues to push sales of its jeeps to the Government. The company last month appointed Brig. Gen. S. R. Hinds (Ret.) to head the military relations section of its Government Sales Div. Gen. Hinds retired from the Army in 1947, and since 1951 has served as supply officer of the Procurement Div. of the U. N. Korean Reconstruction Agency.

AND AVIATION INDUSTRIES

Cutback In Defense Work To Car Makers Pointed Up

A report issued by the Pentagon illustrates the sharp cut that has been made in defense spending since the end of the Korean War. From July, 1953, to January, 1955, the Defense Dept. spent slightly more than \$16 billion on military contracts, compared with nearly \$99 billion from July, 1950, to July, 1953.

Although Ford, American Motors, and Kaiser gained a combined total of about \$78 million in defense contracts in the post-Korean period, four other big producers lost a total of more than \$424 million. The latter group includes GM, which lost \$58 million in defense work; Chrysler Corp., \$111 million; Studebaker-Packard, more than \$199 million; and Diamond T Motor Car Co., about \$56 million.

The gains in new work made by Ford, American Motors, and Kaiser were relatively small. Ford received \$58 million in new work; American Motors, \$16 million; and Kaiser, \$3.9 million.

Wyman-Gordon Co. Acquires A Sizable Interest in Prex

Wyman-Gordon Co. and Prex Corp. have announced the purchase by Wyman-Gordon of a substantial interest in the Prex Corp.

With the additional funds thus made available to Prex, plans are being formulated for the construction of a new plant on land already acquired in Franklin Park, Ill. Present Prex facilities, including those of their Midland Die & Engraving Div., will be moved to the new plant.

Construction is expected to get under way during the summer. Completion of the facilities is scheduled for the third quarter of 1956.

As a result of the Wyman-Gordon and Prex affiliation, the productive capacity for the manufacture of small and medium-size Prex forgings will be greatly increased. At the same time, this technique will be immediately applied in the production of large light alloy forgings made by Wyman-Gordon on the heavy presses which it operates in the Air Force Heavy Press Plant at North Grafton, Mass.



DEMON ON RAILS DRIVEN BY BUICK ENGINE

This tear-drop rail car, designed and built by the industrial machine shop of Frasier Wright Co., is in service at Edwards Air Corps Base, Inyokern, Calif. Missile center there uses it to haul trailer banks of scientific cameras and equipment to photograph rockets. Engine is a modified Buick power plant, and more than a dozen electric motors are used to power all the special controls incorporated in the vehicle.

Power Brakes for Most Vehicles Now Offered by Willys Dealers

Willys now offers power brakes for all utility vehicles and passenger cars built since 1950. They are not adapted, however, to the universal jeep and military vehicles. The hydraulic power units are not available as factory-installed equipment, but are offered only as a dealer-installed accessory.

GAW Principle Now Appears In Some Supplier Contracts

Albeit with some understandable resistance, some automotive parts suppliers are beginning to fall into line in granting the unemployment benefits principle set by Ford and General Motors. First among the smaller producers to grant a modified GAW package were Eaton Manufacturing Co. and Barcy-Nicholson Co.

The GAW principle also has been embodied in a contract signed by 6000 tool and die workers and the Automotive Tool and Die Manufacturers Association. The three-year contract calls for skilled workers to get a 15-cent an hour raise immediately, while non-skilled workers receive eight cents and apprentices 11 cents.

The contract further calls for another seven-cent raise in 1956, and the other classifications will get six cents. In a form of modified GAW,

the companies put five cents an hour for each hour worked into a fund. An employee may get money from this fund in event of layoff or discharge. The following year the skilled workers are upped eight cents, and the other two groups receive six more cents each.

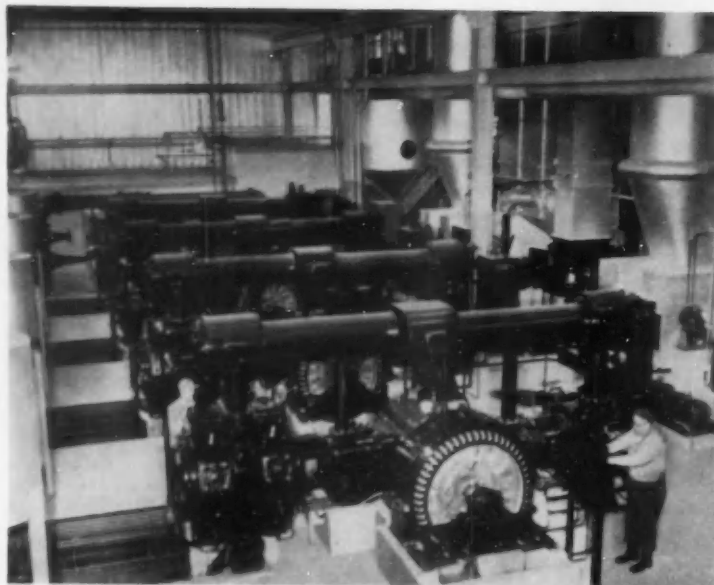
Eaton's contract, signed last month with the union, covers more than 4000 workers in four plants, while Barcy-Nicholson's covers 60 hourly workers in its Detroit plant. The latter company makes small car stampings.

Both are three-year contracts embodying supplement unemployment benefits. They are also similar to Ford and GM contracts in other aspects, such as wage hikes and increased fringe benefits.

Whether the smaller companies will be able to carry without undue difficulty the bigger load placed on them remains to be seen. Barcy-Nicholson already has indicated that it will ask its workers to take a pay cut if the layoff plan proves too expensive.

Thousands of other companies with their labor contracts running out, or already expired, are beginning to feel the pinch of GAW. Some already have been shut down by strikes as the union demand for the pattern sweeps through the industry.

News of the AUTOMOTIVE



The compressor room at the Ford Mahwah, N. J., plant contains four Worthington air compressors. At the far right, beyond wall columns, are (1) water softener, (2) stack breaching and induced-draft fan, (3) air preheater, and (4) air intake and forced-draft fan. Along left wall are the compressor cooling-water surge tanks.

Ford Plant at Mahwah, N. J., Swings Into Production

A further example of the swift efficiency with which automobile manufacturers can move operations and personnel from one facility to another without interrupting production appreciably is the new assembly plant of Ford Div. of Ford Motor Co. at Mahwah, N. J. Comparable to a similar rapid move from the former Ford Richmond, Calif., assembly plant to the new San Jose, Calif., unit (see *AI*, March 1, p. 13), the present Edgewater, N. J., plant (which the Mahwah unit replaces), was scheduled at presstime to continue full production until Friday, July 15. With tools, furniture, and equipment moved over the intervening week-end, full production was expected to start at Mahwah on Tuesday, July 19.

Size Defies Imagination

Mahwah is the largest of the 18 Ford and Mercury Div. assembly plants in the U. S., according to Angus M. Harris, manager, Edgewater-Mahwah assembly plants. The plant site comprises 177 acres of level ground

and contains the main assembly building, an employee facilities area, a two-story administration building, and a separate power house.

There is a 90-ft-wide craneway along the entire east side of the main assembly building. This provides the unloading area for all the freight and automotive parts coming into the plant. This craneway contains a double railroad track with capacity for almost 100 freight cars inside the building at one time.

The main assembly building, which measures 2100 by 790 ft, contains 1.9 million sq ft of operating area, or 40 acres under one roof. It is 700 yd long, or the length of seven football fields laid end to end.

There are 10 miles of aisle space throughout the plant. These are maintained at 12 to 15-ft widths to expedite in-plant traffic and to conform with standard safety requirements. Five miles of overhead conveyors, and more than 2½ miles of floor-type conveyors carry automotive parts and progressive assemblies toward the fin-

ished product. The latest developments in paint spraying systems and gas-fired ovens, welding equipment, tools, etc., have been installed along the assembly lines.

Functional Plant Layout

The operating functions of the plant are performed by a passenger car assembly system and a truck assembly system which are completely separate from each other. Concentrating passenger car production in one area and truck production in another is said by Ford to permit better stock distribution, manpower assignment, and quality control. In addition, the plant will handle the packing and shipping of automobiles and trucks for export.

If necessary, the plant will be able to operate on a full two-shift basis with approximately 5000 employees. It will have a peak production capacity of 800 cars and 280 trucks per 16-hr day. This production includes the full range of all Ford car and truck models, types, and colors.

Power Service Facilities

One of the time-saving features incorporated into the construction planning was the awarding of a separate contract for the power service facilities which furnish steam and compressed air for the assembly plant. These are housed in a separate building to enable Ford engineers to take advantage of "turnkey" construction to speed up erection of the structure and equipment.

Contract for the boiler and compressor house was awarded to Dravo Corp. Ford specified the quantity of steam and compressed air needed and left the details of construction engineering and erection up to Dravo. By doing this, a completed boiler-compressor plant was turned over to Ford ready to operate.

Continental Canada Plant Starts Expansion Program

Continental Motors of Canada, Ltd., has broken ground for a new plant on a nine-acre site located in St. Thomas, Ont. To occupy 30,000 sq ft of space, the factory will combine fabrication, assembly, and warehousing operations.

AND AVIATION INDUSTRIES



POWERAMA PREVIEW

Planning a giant show of Diesel and aircraft power are Harlow H. Curtice (left), president of General Motors, and C. R. Osborn, vice-president in charge of GM's Engine Group as they inspect a scale model of the GM Powerama (see AI, June 15, p. 106 and July 1, p. 35). Scheduled for Aug. 31 to Sept. 25 in Chicago, the exposition will feature giant machines and other equipment produced or powered by GM's Diesel, aircraft, and heavy equipment divisions for various applications.

Cadillac Station Wagon To Be First in History

Cadillac will offer a station wagon for the first time under an arrangement with a specialized body builder. Hess and Eisenhardt Co., Cincinnati, O., which builds ambulances, hearses, and special-purpose vehicles, will supply the station wagon bodies on the Cadillac chassis to customer order.

The bodies will be custom-made to buyers' specifications. Most demand is expected to come from hotels and resorts, clubs, sightseeing companies, and from concerns wanting impressive "courtesy" cars.

Thompson Acquires Calif. Aircraft Parts Producer

Thompson Products, Inc., has acquired Karl-Douglas Associates, Inc., Hawthorne, Calif. Established in 1945, Karl-Douglas has been developing and manufacturing hydraulic and pneumatic cylinders and valves for the aircraft industry. The company will be operated as a division of Thompson's West Coast plant.

AI TABLOID

Lockheed Aircraft Corp. and Bell Aircraft Corp. have confirmed reports of merger discussions, but neither sees such a move imminent. The latter has received a preliminary \$1 million helicopter order from the Air Force.

Bendix Aviation Corp. will construct a new \$2 million engineering building for its Radio Div. at Towson, Md.

F. L. Jacobs Co. has acquired Eicor, Inc. . . . Westinghouse Air Brake Co. has purchased Corvey Engineering Co. . . . Michigan Steel Casting Co. has acquired Standard Alloy Co.

Hydraulic Press Manufacturing Co. has refuted reports that it will not continue as an independent company.

Kearney & Trecker Corp. held dedication ceremonies at its new Special Machinery Div. plant in West Allis, Wis., on June 24.

Defense Dept. disclosed that new ram-jet engines developed by Curtiss-Wright Corp. have now reached the point where they are suitable for operational use in missiles designed to travel up to 3500 mph at sea level.

U. S. Steel Corp. has announced an increase of about 5.8 per cent in its steel prices.

Stewart-Warner Corp. and John W. Hobbs Corp. have signed an agreement for the purchase by the former of the entire business and assets of Hobbs.

Stockholders of General Dynamics Corp. and Stromberg-Carlson Corp. have approved a proposal to merge the two companies.

Sun Oil Co. has disclosed that it is putting approximately \$33 million into the search for new sources of crude oil this year.

Atwood Vacuum Machine Co. has purchased Press Products, Inc. . . . Lyon, Inc., has bought a controlling interest in Canadian Motor Lamp Co., Ltd.

White Motor Co. has introduced a new "9000" line Diesel tractor of lightweight design for hauling heavier truck payloads.

Douglas Aircraft Co., Inc., has appointed C. Itoh & Co., Ltd., as commercial sales representative in Japan.

Goodyear Tire & Rubber Co. is building a new large distribution center in Brook Park Village, O. . . . Construction work on the new Pittsburgh Plate Glass Co. plant at Cumberland, Md., is now underway.

Capital Airlines will initiate scheduled service with its new Viscount turboprop planes on July 26.

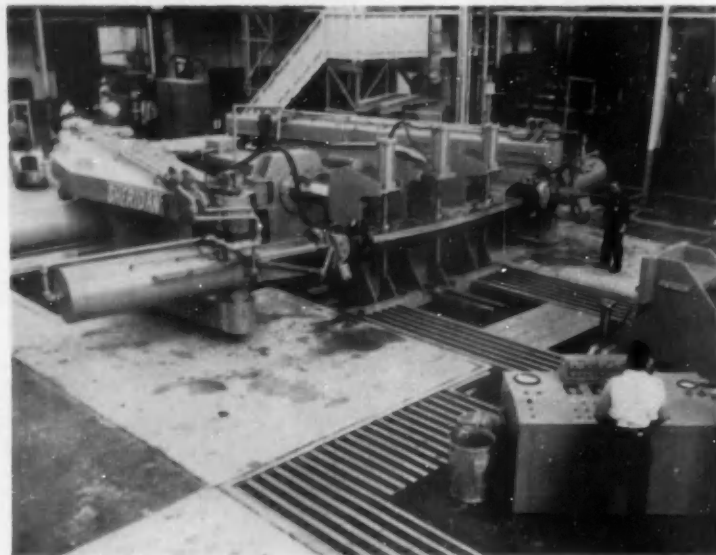
Linde Air Products Co. is building a \$15 million silicone plant at Long Reach, W. Va. . . . Heiland Div. of Minneapolis - Honeywell Regulator Co. will erect a new \$1 million plant in Denver, Colo.

American Pulley Co. has purchased from Standard Pressed Steel Co. rights, tooling, equipment, and inventory for the latter's line of pressed-steel platform trucks.

McDonnell Aircraft Corp. has delivered to the Navy its first F3H-2N Demon single-jet, carrier-based fighter . . . Ames Aeronautical Laboratory has reached the small-scale model stage with an airliner that can take off and land vertically.

(Turn to page 110, please)

News of the AUTOMOTIVE



MAMMOTH STRETCH PRESS AIDS B-52 PRODUCTION

Said to be the largest stretch-forming press of its type ever made is this new Sheridan equipment now in operation as part of the B-52 production program at the Wichita Div. of Boeing Airplane Co. The 180-ton press is being used to form large extrusions.

HALF-YEAR OUTPUT IS UP 44 PER CENT OVER 1954 1955 Passenger Car Production

As reported direct to Automotive Industries by the car factories

	June 1955	May 1955	June 1954	Six Months	
				1955	1954
Hudson	4,987	3,565	3,671	34,030	14,308
Nash	12,320	14,650	4,561	71,613	38,527
Total—American Motors	16,307	18,214	8,232	105,643	49,835
Chrysler	10,267	17,573	7,646	111,753	96,833
De Soto	10,521	11,545	4,741	79,095	37,600
Dodge	25,925	23,383	11,685	179,180	67,950
Plymouth	68,610	69,143	43,706	422,190	216,396
Total—Chrysler Motors	120,624	120,964	67,979	793,026	379,781
Ford	149,105	183,294	129,541	994,647	750,049
Lincoln	2,146	3,986	2,879	21,676	22,095
Mercury	40,909	42,627	22,661	233,900	153,135
Total—Ford Motors	192,160	230,007	155,081	1,250,223	925,279
Buick	63,373	76,925	49,246	425,067	267,042
Cadillac	11,562	13,497	12,250	62,201	61,741
Chevrolet	130,660	164,053	130,456	938,941	760,700
Oldsmobile	94,450	97,060	44,160	526,413	223,962
Pontiac	44,561	54,629	26,169	312,310	194,605
Total—General Motors	304,644	386,964	264,042	2,066,922	1,528,110
Packard	7,617	6,136	3,012	43,294	19,564
Studebaker	7,392	9,962	6,176	71,964	42,582
Total—S-P Corp.	15,009	16,102	9,188	115,248	62,146
Kaiser	894	406	900	1,062	6,080
Willys	894	406	1,362	5,699	8,350
Total—Willys Motors	894	406	2,312	6,661	13,430
Total—All Makes	649,626	724,506	504,606	4,258,053	2,957,576

Ford Stock May be Offered To Its Salaried Personnel

Ford Motor Co. stock, expected to be sold to the public sometime this year, may be offered to Ford employees at a reduced price under a plan being considered by the company. In recent bargaining sessions with the union, hourly workers were given a chance to buy the stock at half price, but the union rejected the offer.

Under the proposed plan, only the 46,000 salaried personnel would be eligible to participate in the stock purchase, and the company would contribute a portion of the purchase price. The company has not indicated what amount it would contribute to the stock the workers would buy, however.

The company also announced the following benefits to salaried workers, retroactive to June 1: A 2½ per cent pay increase annually, or \$10.40 a month, whichever is greater, for employees earning monthly base salaries of \$765 or less, and an increase to \$785 for employees earning more than \$765 but less than \$785 a month; a seventh holiday, to be taken as half-days preceding Christmas and New Year's; triple time for holidays worked by eligible employees and a day off after each holiday occurring on Saturday.

Additional benefits include: An extra half-week's vacation for employees with 5 to 10 years service prior to Jan. 1, and with monthly base salaries of less than \$786; and liberalized cost-of-living allowances.

Car Output Declines Slightly After Chalking Up New Record

Car and truck production may drop off 25 per cent or so during the third quarter but should pick up again after that, and the outlook now is for a 7.5-million-car year in 1955. The industry wound up the first half with about 4.2 million automobiles and more than 600,000 trucks for a grand total topping 4.8 million vehicles, highest first half in history.

The current quarter should see about 1.5 million cars turned out, and coupled with the new model push in the last quarter, production could hit 1.8 million units for a grand total of

AND AVIATION INDUSTRIES

7.5 million, an all-time record. By adding at least a million trucks to the total, the year's vehicle output would reach 8.5 million, also a record for the year.

First indication of a slowdown in production—as well as sales—occurred in June, when General Motors reported car output for the month at 322,021 units, a noticeable drop under the 384,714 for May. At Ford, production of cars in June dropped to 192,162 units from better than 199,000 in May.

Chrysler Corp. was the only producer among the Big Three which held output at almost the same level in June as it did in May. Total production dropped by only 300-odd units as the corporation turned out 120,624 cars in June against 120,954 in May.

Clear Road Lies Ahead

Settlement of the shortest steel strike in history, plus agreement on the modified GAW between car makers and the union, now assures the industry of a record year. The automobile industry is the steel industry's biggest customer in using about 20 per cent of the national output, and a strike would have dealt a serious blow to car production. Most automobile companies have been on short steel inventories in current record production.

The agreement in the steel industry opens the way for a new wave of price increases. Although automobile manufacturers have not indicated they would boost prices on 1955 models, it seems likely that prices on 1956 models will be hiked.

U. S. Steel was the first to announce that it is boosting prices on steel about 5.8 per cent following the agreement to increase wages of its hourly workers slightly more than 15 cents an hour. Other steel producers are expected to follow the U. S. Steel pattern in prices.

U. S. Steel has estimated that the new pricing would raise the cost of steel by about \$15 in automobiles selling between \$2500 and \$3000. The increase raises the average price of steel from \$125 a ton to \$132.50.

Continued on Page 106

TRUCKS CONTINUE TO MAINTAIN LEAD OVER 1954 SALES 1955 U. S. Motor Vehicle Factory Sales*

	Passenger Cars	Trucks	Buses	Totals	
				1955	1954
January	630,513	88,676	190	725,379	551,134
February	677,705	87,081	170	764,956	634,148
March	791,260	102,982	325	894,567	633,903
April	753,434	127,867	510	881,811	631,780
May	721,130	127,941	313	849,384	689,662
Total—Five Months	3,579,071	516,557	1,523	4,096,151	2,936,613

1955 U. S. Motor Truck Factory Sales by G.V.W.*

	5,000 lb. and less	5,001-10,000	10,001-14,000	14,001-18,000	18,001-25,000	Over 25,000	Total
January	42,396	19,055	4,099	16,400	4,741	3,579	89,670
February	30,036	11,277	2,845	11,911	3,875	3,380	62,324
March	48,816	16,275	4,155	19,176	4,363	4,720	102,992
April	61,365	22,175	4,534	23,779	5,417	4,230	121,501
May	60,287	21,721	5,149	24,450	6,498	5,734	127,837
Total—5 Mos. 1955	242,900	80,506	20,842	85,775	24,804	18,110	412,937
Total—5 Mos. 1954	215,650	87,461	17,618	86,791	19,760	25,223	412,937

* Automobile Manufacturers Association.

PLASTIC ATOM

Nicknamed the "Atom," this three-seater car has an engine in the rear and a plastic body. It is priced to sell in the neighborhood of \$1000.



United Press



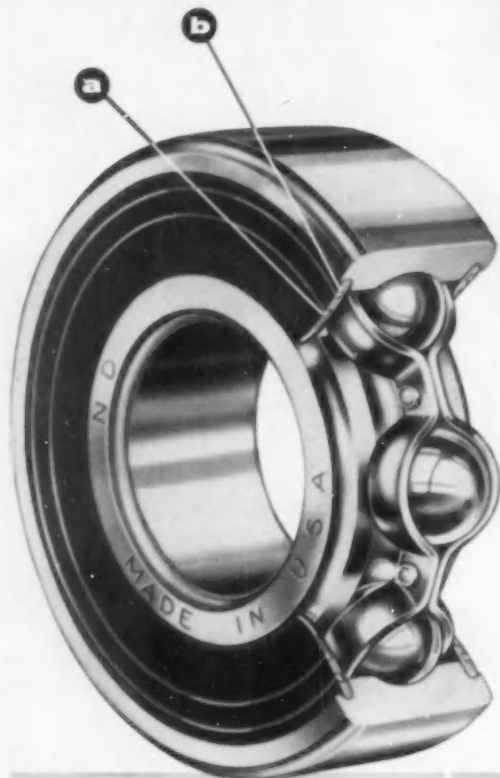
FIAT DIESEL TRACTOR HAULS LONG TRAILER

The Fiat 682T tractor for transporting cargo is shown attached to a long trailer. The tractor is powered by a 140-hp Diesel engine.

FACTS

about

NEW DEPARTURE BALL BEARINGS



New Senti-Seal...on guard against dirt and wear!

The unique design of the Senti-Seal gives optimum protection against dirt, and includes a number of other major advantages.

Senti-Seals are quickly removed, easily replaced. As the seal is of synthetic rubber, in which two metal rings are embedded, a constant-rate spring is created between the rings. Inherent flexibility prevents distortion of the bearing outer ring due to seal insertion, permitting the use of bearings to the higher accuracy specifications. The spring action maintains an efficient sealing contact with the bearing ring to bar dirt and retain lubricant. Senti-Seals are relatively inert to oils and greases and operate satisfactorily through a temperature range of -40°F to 225°F . Specifications available for still higher temperatures. In applications where relubrication is desired, it is easily accomplished by the injection method.

The New Departure Senti-Seal basically consists of two separate metal rings, "A" and "B", embedded in synthetic rubber, resulting in a spring which absorbs distortion and deflection. The seal is not drastically influenced by axial displacement due to bearing end-play within prescribed tolerances, and provides efficient sealing at low torque. Bearing shown is equipped with two seals.



ONE SENTI-SEAL



SEAL AND SHIELD



SEAL AND SNAP RING



TWO SEALS AND SNAP RING



SEAL, SHIELD AND SNAP RING

The diagram shows in section the New Departure Senti-Seal. Lip contacting surfaces are form-ground simultaneously with the ball race, giving an extremely high degree of concentricity between sealing surfaces and the raceway.

Senti-Seal is available for a range of sizes in single-row, standard-width bearings and also in two types of New Departure adapter bearings. Sizes, dimensions and capacities are listed in the latest New Departure catalog.

Write for full details on Senti-Seal



NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONN.

Men in the News



Bendix Products Div., Bendix Aviation Corp.—W. R. Williams has been appointed executive sales engineer.

General Electric Co.—**Henry Ford II** and **Gilbert W. Humphrey** have been elected to the board of directors.

Bullard Co.—**Francis L. Dabney** was elected a director.

Eaton Mfg. Co.—**Logan Monroe** has been made vice-president-controller; **Herbert S. Ide, Jr.**, vice-president-treasurer; and **Raymond G. Hengst**, secretary.

American Motors Corp.—**Edward L. Cushman** has been elected vice-president in charge of industrial relations, and **Edmund E. Anderson** has been named director of automotive styling.

Moraine Products Div., General Motors Corp.—**Elton S. Moyer** is now assistant chief engineer.

Thompson Products, Inc.—**Gen. Benjamin W. Chidlaw**, U. S. Air Force (Ret.), has been named a vice-president.

Carborundum Co.—**Oliver A. Gottschalk** has been elected treasurer-controller, and **George J. Zimmerman** has been named assistant to the president.

Chevrolet Motor Div., General Motors Corp.—**Edward Gray** has been named an assistant chief engineer in charge of production engineering.

Illinois Tool Works—**Emil J. Koe** has been promoted to director of industrial relations.

Kearney & Trecker Corp.—**John P. Bunce** has been appointed staff assistant to the manufacturing vice-president.



Lindberg Engineering Co., Heat Treating Furnace Div.—Norbert K. Koebel is now manager.



Kearney & Trecker Corp.—Henry H. Lentzner was named vice-president in charge of manufacturing, and Ronald F. Zemke was made works manager of the Standard Machine Div.

Nash Motors of Canada, Ltd.—**R. J. Orr** has been appointed general sales manager, and **Reg. A. Gibson** has been appointed plant manager.

Ford Motor Co.—**Robert S. Dunham** has become general industrial relations manager, salaried personnel, while **Malcolm L. Denise** has been made general industrial relations manager, labor relations.



Borg & Beck Div., Borg-Warner Corp.—Harold Nutt has been elected president and general manager.

Ahlberg Bearing Co.—**Ernest J. Klimczak** has been made general manager, and **Melvin G. McGregor** has been chosen sales manager.

U. S. Rubber Co., Mechanical Goods Div.—**G. Allen Lovell** has been appointed general manager.

Republic Aviation Corp.—**A. Theodore Mattison, Jr.**, is now controller.

Hooker Electrochemical Co.—**R. Lindley Murray** has been elected chairman of the board, and **Bjarne Klausen** has been elected president.



Clark Equipment Co., Axle Div.—F. D. Wise has been named advertising manager.

National Automatic Tool Co., Inc.—Kenneth P. Martin has been appointed vice-president in charge of sales.



Borg & Beck Div., Borg-Warner Corp.—**Clyde Bissell** and **Edward H. Lipke** have been named vice-presidents.

Pennsylvania Salt Mfg. Co.—**William P. Drake** has succeeded **George B. Beitzel** as president.

Texas Co.—**James W. Foley** has been elected executive vice-president.

Willys Motors, Inc., Central Sales Div.—**Charles W. Grinstead** is now manager.

Ford Motor Co., Special Products Div.—**J. C. Doyle** has been named general sales and marketing manager, and **J. B. Lackey** has been appointed divisional controller.

(Turn to page 110, please)

Necrology

Dolph H. Odell, 67, retired manager of the Advertising Dept. of General Motors Corp., died June 28, at Dayton, O.

Andre P. E. Planiol, 61, consulting engineer for Stratos Div. of Fairchild Engine & Airplane Corp., died June 30, at New York, N. Y.

James E. D. Pew, 55, manager of the Natural Gas and Natural Gasoline Div. of the Sun Oil Co., died June 20, at Malvern, Pa.

J. Cameron Argetsinger, 71, a vice-president of Youngstown Sheet and Tube Co., died recently, at Youngstown, O.

John T. Hoffman, 69, retired purchasing agent for Chevrolet-Toledo Div. of General Motors Corp., died June 25, at Toledo, O.

Rufus E. Zimmerman, 68, a former vice-president of U. S. Steel Corp., died June 21, at Summit, N. J.



**WALLACE
BARNES
COMPANY**

BRISTOL,
CONNECTICUT

**THE WILLIAM
D. GIBSON
COMPANY**

1800 GLENBOUR AVE.
CHICAGO 14,

**RAYMOND
Manufacturing
COMPANY**

CORRY,
PENNSYLVANIA

**BARNES-
GIBSON -
RAYMOND**

40300 PLYMOUTH RD.
PLYMOUTH, MICH.

**B-G-R
COOK
PLANT**

ANN ARBOR
MICHIGAN

DIVISIONS OF
**ASSOCIATED
SPRING
CORPORATION**

COAST TO COAST

**SEABOARD
Coil Spring Div.**

15001 S. BROADWAY
GARDENA, CALIF.

**OHIO
DIVISION**

1835 EAST FIRST ST.
DAYTON, OHIO

**WALLACE BARNES
CO.**

STATE FAIR BLVD.
SYRACUSE 9, (Saratoga), N.Y.

**MILWAUKEE
DIVISION**

341 E. ERIE ST.
MILWAUKEE, WIS.

**DUNBAR
BROTHERS
COMPANY**

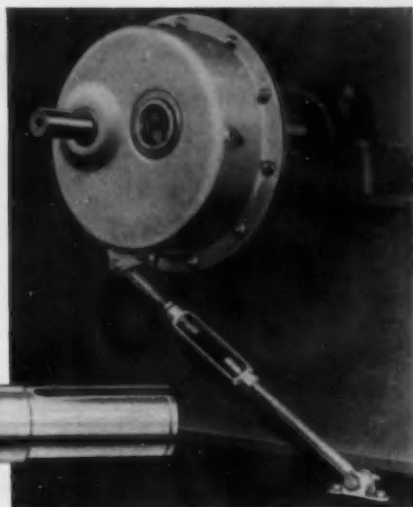
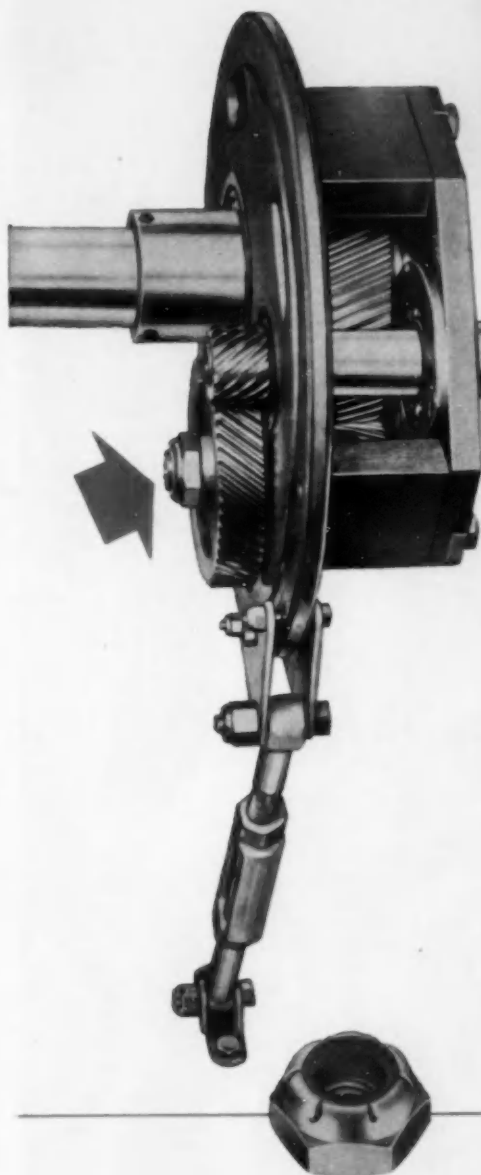
BRISTOL, CONN.

**F. H. MANROSS
AND SONS CO.**

BRISTOL
CONNECTICUT

**THE WALLACE BARNES
CO., LTD.**

HAMILTON
CANADA



The Falk Corp., of Milwaukee, also uses Elastic Stop nuts in the tie rod assembly . . . and on the gear housing to maintain tight cover fit.

Elastic Stop® nuts solve critical gear adjustment problem in new speed-reducing unit!

In its rugged new Shaft-Mounted Drive, The Falk Corporation uses a self-locking Elastic Stop nut to secure the high-speed gear to the intermediate shaft, as shown in the illustration on the left.

The precision-made Elastic Stop nut stays firmly in place and the close seat-squareness tolerances maintain the exact original gear adjustment withstanding severe vibration caused by shock loads transmitted through the gears. Costs are cut because drilled bolt holes and cotter pins are eliminated.

Here's how this Elastic Stop nut works: The familiar red collar of the Elastic Stop nut is deliberately undersized in relation to the shaft (or bolt) diameter. It grips the shaft with a perfect fit, enforces a continuing self-locking pressure against the metal threads, and holds the nut securely in place at the desired point on the shaft. This same tight-fitting locking collar also provides a seal that prevents oil from seeping along the bolt threads, wherever oil seepage is a problem. And because the bolt threads are protected against moisture from without, the nuts cannot become "frozen" to the bolt by corrosion. The elastic recovery of the red collar permits extended re-use of Elastic Stop nuts.

Mail the coupon for information on how Elastic Stop nuts can solve your specific fastening problem.

ELASTIC STOP NUT CORPORATION OF AMERICA



Elastic Stop Nut Corporation of America
Dept. M67-75, 2320 Vauxhall Road, Union, N. J.

Please send the following free fastening information:

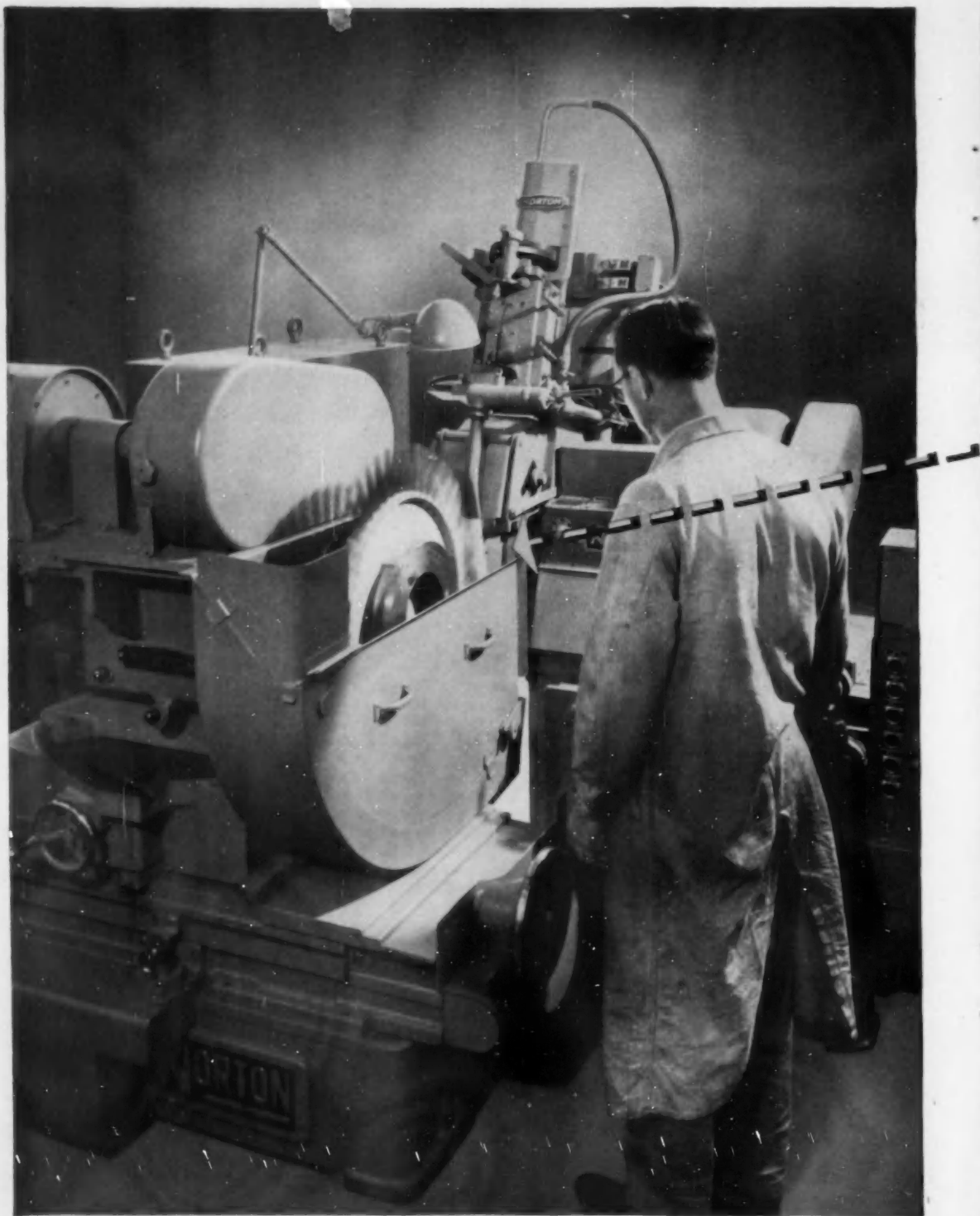
- ☐ ELASTIC STOP nut bulletin ☐ Here is a drawing of our product. What self-locking fastener would you suggest?

Name _____ Title _____

Firm _____

Street _____

City _____ Zone _____ State _____



Grinding Short Parts With Large Diameters, like this compressor wheel, is a much faster and easier job on the Norton 42" Hi-Swing Semiautomatic Chucking Grinder. To the standard advantages of Norton semiautomatic design this machine adds many advanced features of its own for easier loading and unloading and faster, simplified operation. Results: less tiring work for your operators — a consistently higher production rate for you.

Now you can grind large diameter, short parts



The Norton 42" Hi-Swing Semiautomatic Chucking Grinder features speed, adaptability and easy operation

For "Hi-Swing" in the name of the Norton 42" Hi-Swing Semiautomatic Chucking Grinder you can substitute "high speed," "high efficiency" or "high production" — and you'll be right every time!

Designed especially for rapid, accurate grinding of large diameter, short parts — such as jet engine compressor wheels and many similar components — it is particularly suited for jobs where both external and internal grinding are required. It takes work held by chucks, face plates or special fixtures and permits several surfaces to be ground without disturbing the set-up.

For easy operation

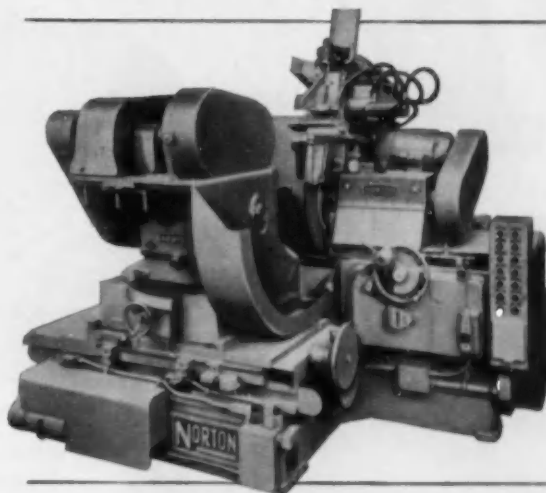
- Automatic or manual work rotation control by simple selector switch.
- Automatic or manual coolant flow control.
- Automatic feed cycle under one-lever control.
- Automatic wheel truing under push-button control.
- Excellent clearance conditions for loading and unloading.
- Maximum visibility of grinding action.
- All controls within easy reach of operator.
- Graduated wheel feed handwheel with "click-count" index.
- Power work head table traverse with automatic reverse by hydraulically operated rotating screw.

The automatic functions of the Hi-Swing Grinder combine to assure you a pre-determined, consistent rate of output. Advanced features like the wheel truing device greatly reduce the requirement of operating skill. And the careful consideration of the operator in the over-all design is still another factor that cuts down fatigue, saves time and enables continuous high production.

In your own plant

you'll find this pace-setting grinding machine a real profit-boosting production tool on many jobs that are now using up too much of your operators' time — and your money.

See your Norton Representative for further details on the 42" Hi-Swing Semiautomatic Chucking Grinder. Or write for Catalog. And remember: only Norton offers you such long experience on grinding wheels and machines to help you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Mass. In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5.



Designed For Easy Maintenance, the 42" Hi-Swing Grinder has all pumps, motors and filters mounted outside . . . pressure relief valves for hydraulic and ways lubrication systems conveniently placed . . . ways lubricant flow control valves at end of base . . . hinged wheel guard cover eases change . . . ramped coolant tank outlet speeds clean-cut . . . electrical controls in raised enclosure for stand-up inspection.

To Economize, Modernize With NEW



GRINDERS and LAPPERS

Making better products . . . to make other products better

District Sales Offices:
Worcester • Hartford • New York • Cleveland • Chicago • Detroit



Lower Cost per piece with

Surface Broaching
of small parts



■ In many plants where large quantities of duplicate metal parts are being machined, substantial savings are being made through the adoption of surface broaching. Production is exceptionally high, close tolerances are maintained, and tool maintenance costs are much lower than with ordinary methods. Foote-Burt engineers, pioneers in this advanced machining method, have had a wide experience in applying surface broaching in many fields.

THE FOOTE-BURT COMPANY

Cleveland 8, Ohio

Detroit Office: General Motors Building

*★ engineered
for
production*

FOOTBURT

PIONEERS IN SURFACE BROACHING



Air Forces give McDonnell's new debutante a big rush!

TEMCO HELPS PRODUCE POPULAR F-101 VOODOO

When the F-101 made her first public bow, she was already a much sought after plane. Designed as a long-range fighter, the *Voodoo* will first be assigned to the Strategic Air Command to escort our jet bombers. But interceptor and tactical air groups also are casting covetous looks at this big new jet. Reportedly the most powerful fighter in the world capable of cruising at well over the speed of sound for hours, she is wanted for defense against bombers and for use as a supersonic fighter-bomber.

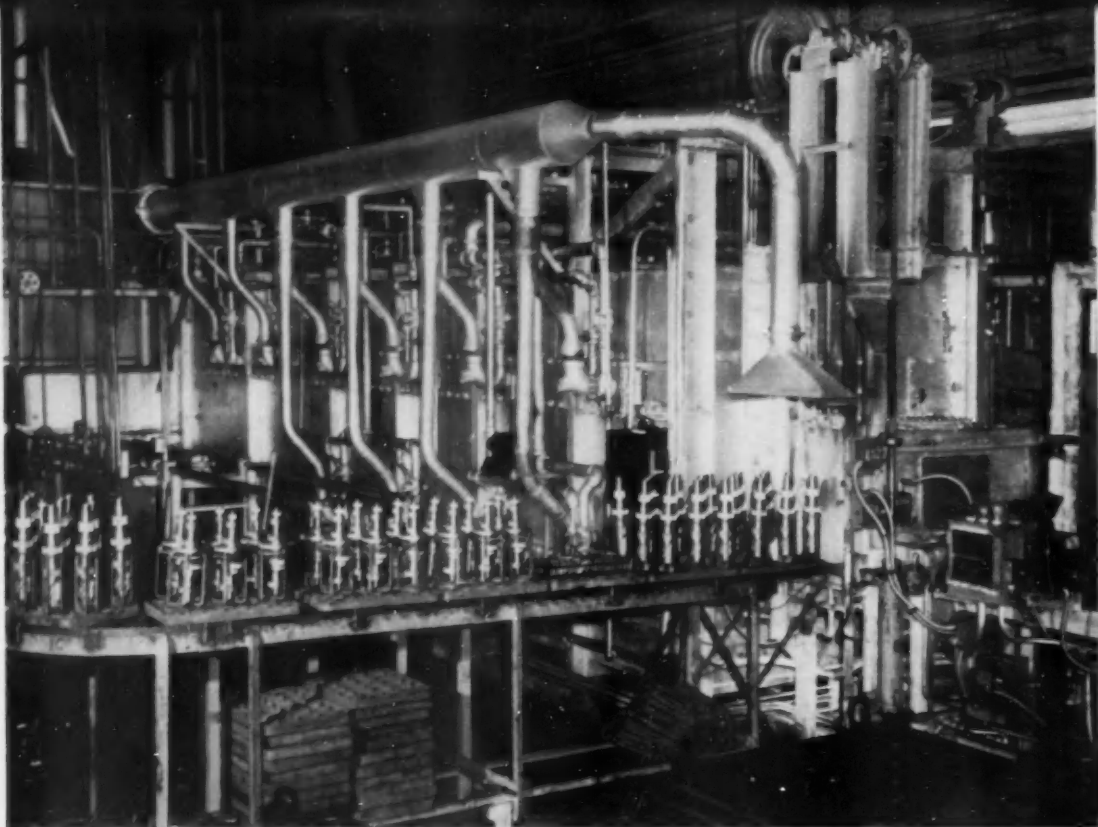
To facilitate production of this important plane, TEMCO was called upon to fabricate aft fuselage sections. The award of this contract indicates the thoroughly satisfactory manner in which TEMCO has been handling work on another McDonnell fighter, the F3H *Demon*, and further establishes TEMCO's reputation for producing a quality product, on schedule, at the lowest possible cost.

ENGINEERS . . . If you are interested in a position with a growing weapon systems organization, write full particulars to E. J. Horton, Jr., Engineering Personnel, TEMCO Aircraft Corporation, P. O. Box 6191, Dallas 2, Texas.



Final assembly and inspection of aft fuselage section of F-101 prior to delivery to McDonnell.





Countershafts and cluster gears, assembled in special carriers, ready for scheduling into this big Holcroft gas-fired furnace.



Close-up of one of the familiar vertical type Tocco induction hardening machines. Axle shafts are hardened all over in one setting.

Many Automatic Machines

TO meet the requirements of its 1955 line of farm tractors, the Ford Tractor & Implement Division created a greatly expanded manufacturing facility in the Ford Highland Park plant. Details of assembly and painting operations as well as automation and conveyorization were given in a previous article (see AI, April 15, 1955). The productive manufacturing area now occupies some 430,893 sq ft of floor space, while 238,041 sq ft has been taken for general assembly operations.

Machining facilities include 17 large transfer machines, the group of Cross Transfer-matics being noted specifically in this article. Some 36 washers and degreasers have been installed to serve the various machining and sheet metal operations.

In keeping with modern methods, the machining areas are served by three separate chip disposal systems, handling 70 tons of chips per day on the average. Approximately 35 tons of cast iron chips are handled by an underground chip drag conveyor system. About 35 tons of steel chips from soluble oil machine operations are processed in an eight-hour day. Here the soluble oil is drained off into oil pits, while chips are conveyed to a chip process unit where they are centrifuged, crushed for briquetting, then routed to gondolas by an underground chip conveyor. Other kinds of chips that contain cutting oils are conveyed to chip processing units for



Big Newton milling machine, fitted with an indexing table, is used for milling the faces of transmission housings.

Used for Farm Tractor Transmissions

centrifuging, crushing for briquetting, then are transported to gondola cars by a pneumatic tube.

The most impressive installation of new transfer machines, incident to the new program, is the group of three large Cross Transfer-matics, including also a big four-way Cross boring machine. This group handles the machining of transmission cases. It is noteworthy that the equipment is designed to process three different types of cases, using the same basic pallet type fixtures. Naturally, changes in tooling are required for each type, making it necessary to schedule production in suitable economic runs since the tool change requires about four hours.

First of the three Transfer-matics is a nine-station unit for processing the top and bottom faces of the case, the cycle comprising the following series of operations: mill faces; drill, ream, chamfer, and tap all holes in top and bottom; straddle-mill the lug and drill hole in lug. Pads on the bottom face are milled with a group of three cutters on the left hand side, while the lug is straddle-milled on the right hand side. Cutting speed on these operations is at the rate of

By Joseph Geschelin

250 sfpm. The top face is milled on the right hand side of station 3 at the rate of 300 sfpm. All milling is done with cutters having cemented-carbide inserts.

Drilling, reaming, tapping, etc., are performed at the other stations with some 143 spindles in action. Tapping of all holes in the bottom face is done with the left hand head; all holes in the top with the right hand head. Finish-milling of the top face, previously rough-milled, takes place on the right hand side at station 9.

The next Transfer-matic in line is a nine-station machine, taking the right and left hand sides of the case to produce the following operations: mill faces and pads; rough-bore axle housing pilot diameters; face rear of pinion boss; cut ring gear clearance; drill, chamfer, and tap all holes. Latter group of operations requires some 184 spindles in action. (cont'd.)

Milling takes place on right and left hand sides of station 2; boring is done on both sides at station 3; additional milling takes place on the right hand side of station 4. Rough- and finish-cross facing is done on both sides of station 5. The miscellaneous drilling, chamfering, and tapping operations are handled on both sides of stations 6, 7, and 8. Station 9 is unloading.

The third phase of machining is done in a 10-station Transfer-matic, with the following group of operations: mill front face, PTO boss and pinion face; rough-bore pinion and PTO bores; drill, chamfer, and tap holes in front and rear ends. The latter miscellaneous group of operations requires some 62 spindles in action.

Milling is done on both sides of station 2, using cutters with cemented-carbide inserts, with cutting

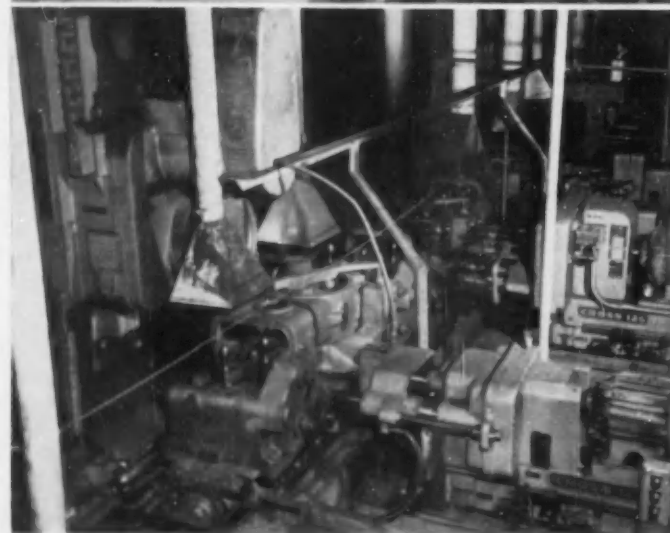
speed of 250 sfpm. Boring, facing, and milling takes place on both sides of stations 3, 4, 5, and 6. Stations 7, 8, and 9 complete all drilling, chamfering and tapping in front and rear ends. Station 10 is for unloading.

It may be noted at this point that each of the three Transfer-matics has the characteristic square-cornered pallet type conveyor enveloping the unit, carrying the pallet fixtures completely around each machine. By this means the work traverses the machine from the loading station and returns to the loading station from the opposite side where the part is lifted out of the fixture and moved to the next machine.

At the end of the line is a large four-way Cross horizontal boring and reaming machine, arranged for finish-boring the previously rough-bored axle housing pilot diameters, pinion bores, and power take-off bores; as well as reaming of dowel holes. In addition to boring of pilot bores, the heads at the right hand side also finish face the flanges. Boring and facing is done with tools fitted with cemented-carbide inserts, cutting speed ranging to 400 sfpm.

Mention was made earlier of the provision of three independent chip disposal systems for the machining areas. These are served by 21 underground chip drag conveyor systems, totaling about 3606 ft in length, together with five, pan type chip drag conveyors running approximately 605 ft. In addition, cutting fluids are supplied to the machines from three central coolant pits; one 30,000-gal soluble oil pit; one 25,000-gal soluble oil pit; and a 25,000-gal cutting oil pit. These facilities, give maximum circulation of cutting fluids to all machine tools.

The manufacture of Ford tractor transmission and final drive gears employs some of the most advanced techniques known to the art. Some of the gears are required to carry unusually heavy loading; all gears are held to extremely close tolerances as to size and form, finish and quietness. In short, the rugged transmission gears demand even more attention to process and qual-



Top—Grinding hydraulic valves for the lift mechanism is done on the Visual-Grind machine seen here. The operator checks progress on an optical projector at the right that magnifies the work 50 times.

Bottom—Perspective view of a section of one of the Cross Transfer-matics in which the center housing is machined. One of the large milling heads may be seen at the left.

ity control details than is expected of normal passenger car transmission gears.

Because of the enormous amount of detail involved in a study of gear manufacture, it is our intention to treat this aspect of the operation in a separate article. For the moment we shall content ourselves with just a few highlights.

Generally speaking, gears are cut on conventional equipment such as Barber-Colman hobbers, G & E hobbers, Lees-Bradner multiple-spindle hobbing machines, the familiar Fellows gear shapers, etc. One of the huge No. 10 Fellows, 10 station gear shapers also is in use here. For the most part, except as noted, the general run of gears are shaved in the green on the familiar National Broach Red Ring shavers, using circular cutters. Although this is usually sufficient for passenger car gears, tractor gears are finish-lapped as well after heat treatment, on a large battery of Michigan Tool gear lapping machines of several types.

Distinctive too is the fact that with but a few exceptions the general run of gears are hardened by induction hardening, using a large battery of high production Weltronic machines, most of them fitted with circular indexing tables, with as many as 10 stations on the table. One of the larger gears requires hardening of the hub as well as a cone-shaped cavity at the opposite end, in addition to tooth hardening. This is done in the same operational cycle. Other gears require hardening of the hub only, in addition to tooth hardening.

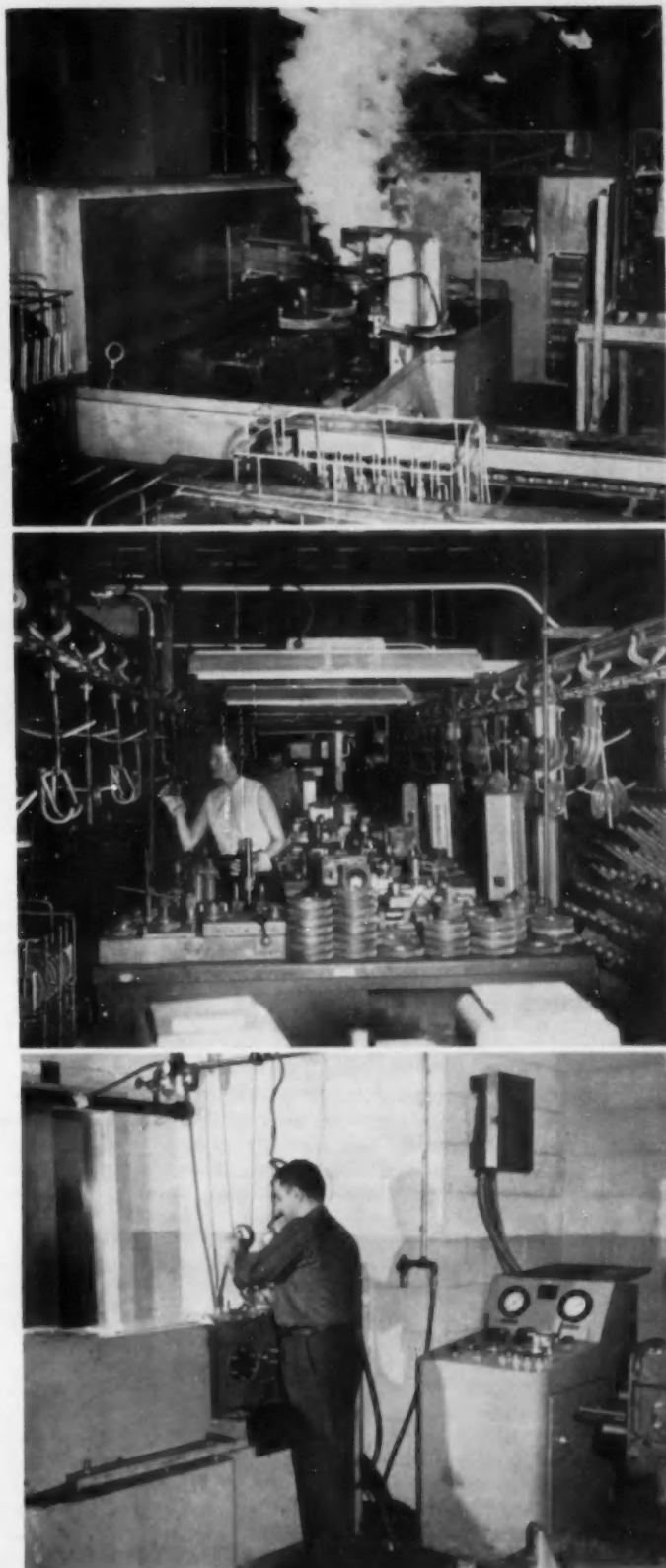
The bull gear, representing the largest mass in the gear train, has the teeth cut in one pass on some of

(Turn to page 130, please)

Top—Close-up of one of the large Weltronic induction heating machines. This one is in action hardening output gears.

Middle—Last stage in gear department—final inspection of all gears before acceptance for assembly in transmissions.

Bottom—Transmission assemblies enter this sound-proof booth on a conveyor directly from assembly operations. They are lifted off the conveyor, installed on the test machine at the left to check for noise and operating characteristics under full load.



FRENCH AIRCRAFT INDUSTRY

Regains Former Important Status

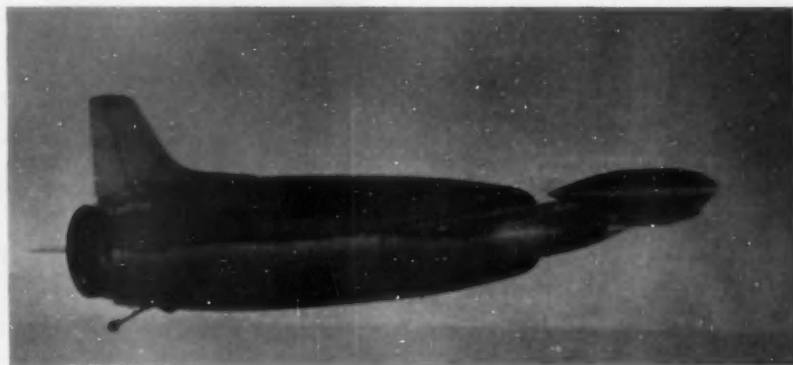
Progress of Airplane Builders in France Shown by Exhibits at International Aviation Show

PARIS, FRANCE

THE 21st French Aero Salon, held in a special 108,000 sq ft hall at Le Bourget airfield, brought together exhibitors from France, Britain, U. S. A., Germany, Belgium, Holland, Italy, Luxembourg, Poland and Czechoslovakia. The end of the war found the whole of the French aero factories in ruins and, by reason of isolation caused by military occupation, it was estimated that 10 years would be necessary for the industry to regain its previous position. Four or five years were lost by reason of lack of coordination, hare-brained politics and the wastage of funds on projects of no real utility. Since 1950, however, progress has been remarkable, many of the present designs being of international value and, although restricted by the limited home market, quantity production is growing.

At the present time there are 60,000 workers in the French aeronautical industry, compared with 35,000 in 1939. Nationalized under a socialist government, the State factories producing aircraft have 20,000 workers and the State engine factories have 8000. Private enterprise has 10,000 workers on aircraft and 8000 on engines. In addition, there are 17,000 workers in the equipment branch.

The whole of the State engine industry is in the hands of S.N.E.C.M.A., originally the Gnome & Rhone, building radial aircooled engines before the war under Bristol license. While continuing the Bristol-type radials and the low-powered Renault and Regnier models, S.N.E.C.M.A. laid down the Atar series of jets. The most important of this series is the model E, supplemented by the G, which is the same engine with afterburner, giving a thrust of more than 9240 lb. It has been decided that this engine is to be used on the most advanced of the French fighters, the



Leduc experimental ram-jet fighter

Mystere IV B. The French 12th pursuit squadron is already equipped with the Mystere IV A. S.N.E.C.M.A. also displayed a new and smaller jet engine, the Vesta of 2640 lb thrust, details of which were not revealed. Development work is being continued on the jet deviator, manufacturing licenses having been negotiated in America with Aerojet General Corp. and in England with the Bristol Co., but with application to their equipment only. The immediate application seems to be with military planes, but commercial use is expected at an early date. The most powerful of the French turbojets is the S.N.E.C.M.A. Vulcain, of 12,000 lb thrust, at present being flight tested.

Hispano-Suiza, the largest of the private concerns, is working on lines parallel to S.N.E.C.M.A., but got into production at an earlier date by taking up a Rolls-Royce license, first for the Nene and then for the Tay. This model was developed from its original thrust of 6160 lb to 7700 lb without any increase in weight or dimensions and thus became the Verdon and was adopted for the Mystere IV A pursuit planes. Having produced centrifugal type gas turbines since 1945, Hispano-Suiza now announces that it intends to turn to the axial flow type.

The first indication of this is the R-800, built entirely to Hispano-Suiza designs, and at present undergoing tests. Little information has been given regarding it, except that it has a thrust of 2420 lb, which



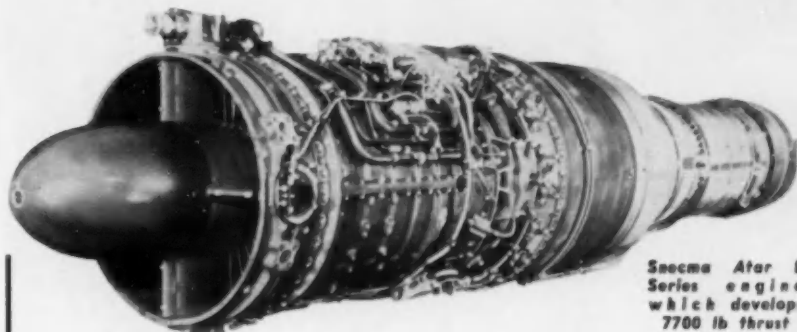
Super Mystere, a supersonic jet fighter

By W. F. Bradley
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

probably will be increased to 3300 lb, for a weight of 605 lb. Examined externally, it seems to follow the usual lines, with fuel and oil pumps at the front, the starting motor, a six-stage axial compressor, a single-stage turbine with an annular combustion chamber and the flame tube designed for an afterburner. The R-800, built under private enterprise, falls into exactly the same class as the Vesta 105 from the State engine factory. These comparatively low-powered gas turbines have been built to the order of the AirMinistry for twin-engined light interceptors. The Hispano-Suiza piston engine, the 12Z of 1300 hp, is apparently being withdrawn and at present is only being built to meet export orders. A third new engine in this low-powered class is the Turbomeca Gabizo which has just completed the official 20-hour type test, consisting of six 20-minute runs, each comprising 15 minutes at take-off rating (2420 lb) and five minutes idling. The engine weighs 560 lb with auxiliaries. The Hispano R-800 will power the Dassault Mystere 26, the Durandal from the South-East Company, and the Breguet 1100.

The French Dassault Co. has just taken up a manufacturing license for the Armstrong-Siddeley Viper, an engine having a thrust of 2200 lb with afterburner, and weighing 495 lb.

Among the private firms building low-powered piston engines, Salmson presented two prototypes, a flat four aircooled and a flat six, each of 4.77 by 556 in. bore and stroke, with a separate belt-driven fan for each line of shrouded cylinders. Respective maxi-



Snecma Atar E Series engine which develops 7700 lb thrust

mum power outputs are 100 and 145 hp.

Making use of all the essential parts in the Panhard flat-twin aircooled engine of 51.8 cu in., Wassmer produced an aviation engine of 35 max hp and 30 continuous hp, with a total weight of 143 lb.

One of the principal exhibits from Czechoslovakia was the Motokov Praga Doris B, an aircooled flat six of 437 cu in. piston displacement, with finned cylinder barrels, finned alloy heads, and roller bearings throughout. Dry weight is 439 lb and maximum output is 200 hp.

Although the British will have their own national show at Farnborough in the fall, all the leading makers were present, with Rolls-Royce, Bristol, Armstrong-Siddeley, De Havilland and Napier. American engine manufacturers were Pratt & Whitney showing, among others, the J57 turbojet; Curtiss-Wright with the J65-W-6 version of the Sapphire, and General Electric with an early J-47-GE-1 with afterburner.

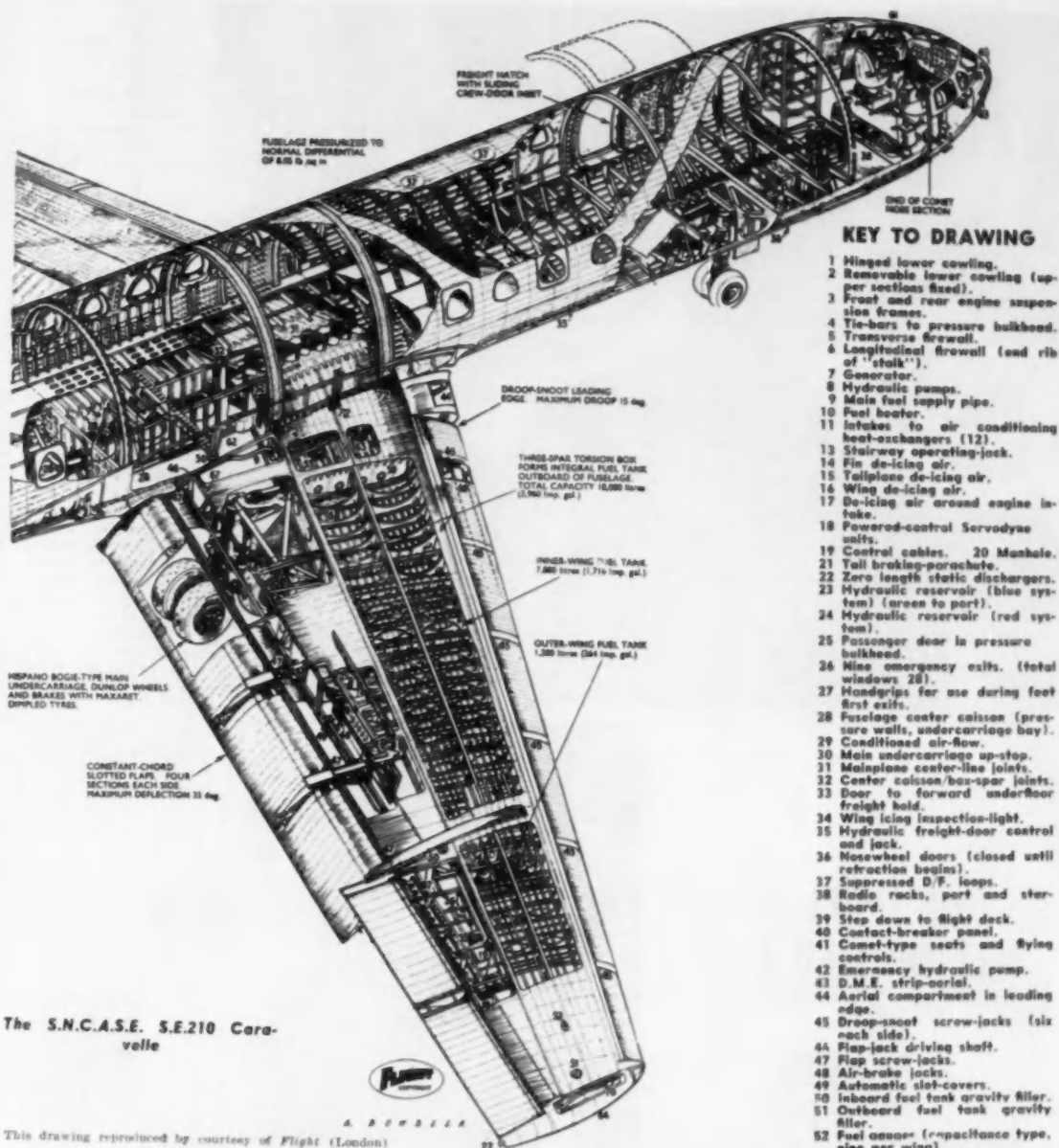
Two entirely different planes stood out in the aircraft section: the Caravelle airliner and the Leduc O21 ram jet fighter. At the end of 1951 a national program called for a turbojet medium airliner. The

main specification was a plane with two jet engines of 9240 lb thrust each. The South-East Co. proposed the SE.210 Caravelle and Hurel-Dubois the H.D. 45. The former was selected and an order placed for two planes to be delivered at the end of July, 1955. The outstanding feature of the Caravelle is the mounting of the two turbojet engines near the rear and to left and right of the fuselage. The power plants are the Hispano-Suiza Avon TR.42 of 9980 lb thrust. This engine position gives full liberty in the design of the low wings which have a span of 113 ft. and allows them to be used exclusively for the housing of the four fuel tanks with a capacity of 5000 gallons. As the fuel feed pipe does not enter the rear of the fuselage for more than a length of three feet, fire risk is considerably reduced. Designed to carry a useful load of 9½ tons on 1450-mile stages, or 70 passengers plus baggage, the cruising speed of the Caravelle is 480 miles at an altitude of 35,000 to 40,000 ft.

The use of two engines only and their rear position will facilitate rapid turn-round. The plane carries its own starting motors and a portion of the floor is hinged to form a gangway when dropped. Before acceptance the Caravelle will have to undergo 500-hour flight tests carried out by the constructor and an additional 500-hour endurance test by the operating company. The first machine is fitted with a parachute brake.



The Leduc O21 single seat ram jet fighter is an extraordinary experimental model, many of the features of which are still being held secret. Designed largely during the military occupation of France, the first ram-jet airplane flight was made in 1949. Designed for supersonic speeds it is at present being launched from the back of a Languedoc carrier and was brought in this way to the exhibition. It was not allowed to make a power landing, but was manhandled off the back of the mother plane. Originally, take-off was by means of small Turbomeca engine mounted in wing tip nacelles, but this arrangement was not

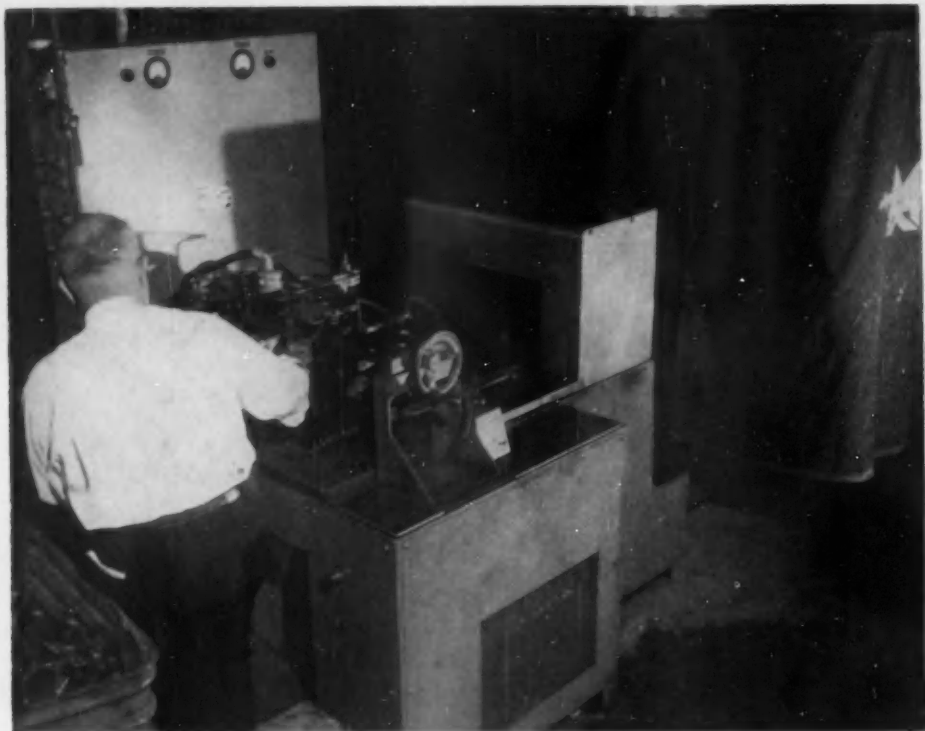


The S.N.C.A.S.E. S.E.210 Caravelle

This drawing reproduced by courtesy of Flight (London)

entirely satisfactory and air launching was adopted. The present plane will have an Atar turbojet internally mounted to give independent take-off and acceleration to ram-jet light-up speed. The extraordinary claim of 140,000 lb thrust at Mach 2 has been made. The pilot is carried in a finely pointed, jettisonable fuselage in the mouth of the central body of the plane which constitutes the combustion chamber formed by a series of concentric annular shrouds, each of which has a triple ring of high-pressure fuel injectors. The pumps, capable of delivering 280 gallons per minute at a pressure of 570 psi, had to be designed specially. The development work on this machine will be followed with world interest.

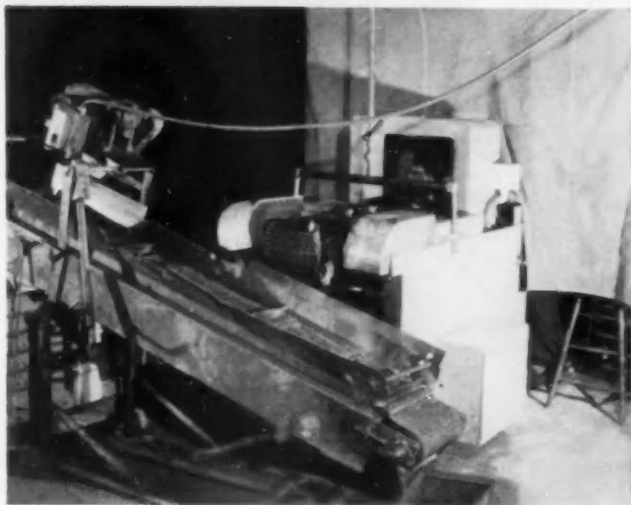
Although not entirely new, the single- (Turn to page 208, please)



Front end — loading station — of Packard Magnaflux Magnaglo installation. The operator places a forging — in this case a connecting rod—between the head- and tail-stock for circular magnetization, then releases the part and places it longitudinally on the conveyor.

Exit end of the Magnaglo machine. Two operators in the rear booth inspect the forgings and return accepted parts to the conveyor. As parts leave the unit they pass through the demagnetizing station, then drop onto the belt conveyor in the foreground for transport to the container at the extreme left.

●
Fully
MECHANIZED LINE
for
MAGNETIC
Inspection of Parts



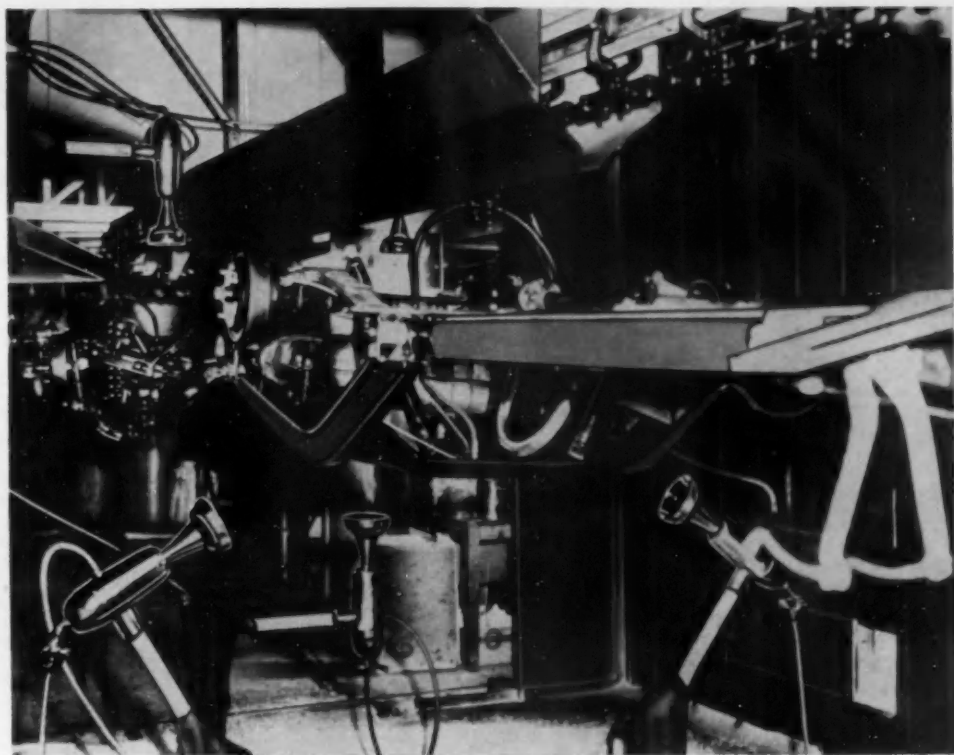
A DISTINCTIVE application of the fully mechanized Magnaflux Magnaglo magnetic particle inspection equipment is found at Packard where one of these specialized units was placed in operation recently. Installed specifically for the inspection of forgings prior to machining, it is being used currently for the acceptance inspection of connecting rods, steering knuckles, and support arms.

Formerly Packard employed visual inspection and, in the case of the steering knuckles, used a magnifying glass for closer control. Magnaglo inspection from

the outset demonstrated that magnetic particle inspection not only provides a more reliable means of disclosing defects in these critical, highly stressed parts but performs the operation faster and more economically. Moreover, as experience is gained with the nature of such defects as are disclosed, it should be practical to improve forging practice to gain still better control and thus reduce forging rejects to the very minimum.

As illustrated, Packard employs a version of the Magnaglo MALQ-1450 equipment, featuring a con-

(Turn to page 134, please)



There are five 6-in. atomizing bells used in this electrocoating setup.

First Use of Electrostatic Spray for Painting Automobile Chassis

STUDEBAKER, in South Bend, Indiana, is the first American automobile manufacturer to employ Ransburg No. 2 Process electrostatic spray painting in coating chassis for their complete line of passenger cars.

Studebaker-Packard Corp. has installed the process in the Studebaker plants as a basic step in its new production methods program to improve work standards. The new equipment is reported to reduce costs for the operation by about 80 per cent.

While Studebaker manufacturing operations were shut down for two weeks last December for car model changes, initial moves were made in a plant rearrangement and facilities improvement program, of which the basic phase of the new chassis painting operations was a part. Results are said to show that the new finishing method further improves quality, providing better and more uniform paint coverage, at the same time it sharply reduces cost. The changeover from automatic spray guns to the more efficient electrostatic spray painting cuts paint consumption from 15 drums of paint per day to 1½ drums, while in-

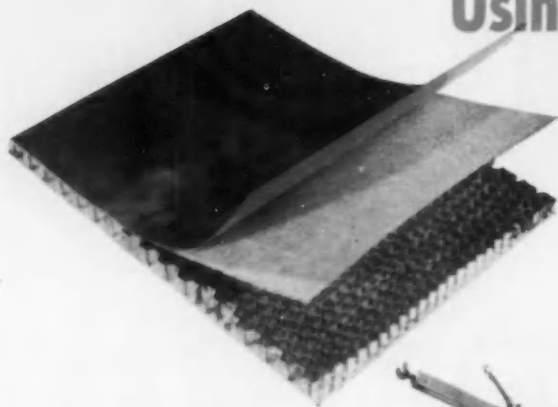
creasing the hourly production rate of chassis by 10 per cent.

The new process resulted from a study of Studebaker's painting operations made last fall by company specialists and Ransburg Electro-Coating Corp. Late in '54, tests were conducted in the Ransburg Indianapolis laboratories for painting chassis under simulated production conditions. Studebaker already was using electro-spray to good advantage in applying prime coat to bodies (see *AI* April 15, 1954). Results of these extensive tests on chassis warranted the changeover. However, since using electro-spray on the job in South Bend, savings proved to be even greater than were first anticipated by lab tests.

Three different lengths of chassis are handled under the present set-up. Hangers are affixed to rear and front axles of the chassis which is painted

(Turn to page 138, please)

Using Marbond Process to Reduce Weight



Sandwich panel showing honeycomb, Marbond adhesive film, and the aluminum skin. When heat and pressure are applied, the core and skin are bonded together to form a strong and rigid panel.

FOR some time, Glenn L. Martin Co. has been working on the bonding of aluminum sheet to a honeycomb core utilizing a variety of adhesives. One of the developments coming from this research was the Marbond process, which is now a well accepted manufacturing technique for producing such components as wings and tail surfaces. Of course, Martin is also using the process for a variety of other aircraft components.

According to Martin engineers, the Marbond process represents the strongest construction available in relation to weight. Face materials are stabilized in compression up to their full yield strength allowing working stresses of 65,000 to 68,000 psi to be developed in face gages as low as 0.008 in. The special adhesive used for Marbonding parts is of the thermosetting type but contains some thermoplastics. It is insoluble in all organic solvents.

For the production of a bonded assembly, the aluminum parts are first cleaned with an alkaline solution. This operation is then followed by a chromic-sulphuric acid bath, a water rinse and an oven drying. A prime coat of liquid adhesive is applied with a spray gun. After this coat dries, a film of the adhesive is placed between the panel and the honeycomb material. This material is then cured to form a finished part.



This unique piece of tooling is used to bond stabilizers for the Martin Matador.

There are several methods utilized by Martin to bond components. If flat honeycomb panels are desired, a heated platen press is utilized for the job. For contoured panels, special tooling is utilized. Parts in this case are assembled on a mold of matching contour with a blanket of special rubber placed over the mold. Air is next evacuated from beneath the blanket so that atmospheric pressure forces the skin and honeycomb together. Parts so processed are next placed in an oven for a predetermined period of time.

Another method used to process contoured panels is the use of a steam heated autoclave. This is, of course, utilized when higher curing temperatures and pressures are required. In this particular case the part would still be placed in the rubber bag with the

Without Loss of Strength

bag, mold, and aircraft part all placed in the autoclave.

One of the latest bonding methods utilized by Martin engineers is a special clamshell type tool equipped with rubber diaphragms and electric blankets. This unit provides a controlled pressure and controlled heat to the assembly. A recess built into the inner face of each structural half of the tool accommodates a rubber bag to which air can be admitted. A flexible blanket containing heating elements is fitted over each bag and made flush with the two inner surfaces of the tool. When the part is admitted, the tool is closed and air is forced into the bags.

One of the most unique tools—of the clamshell type—for Marbond forming is used on the B-61 bomber wing. This particular construction requires different pressures and temperatures at different locations. As an example of the speed at which this material can be utilized, a Matador wing can be produced in one quarter the time necessary for conventional construction, and at approximately one-third of the cost.

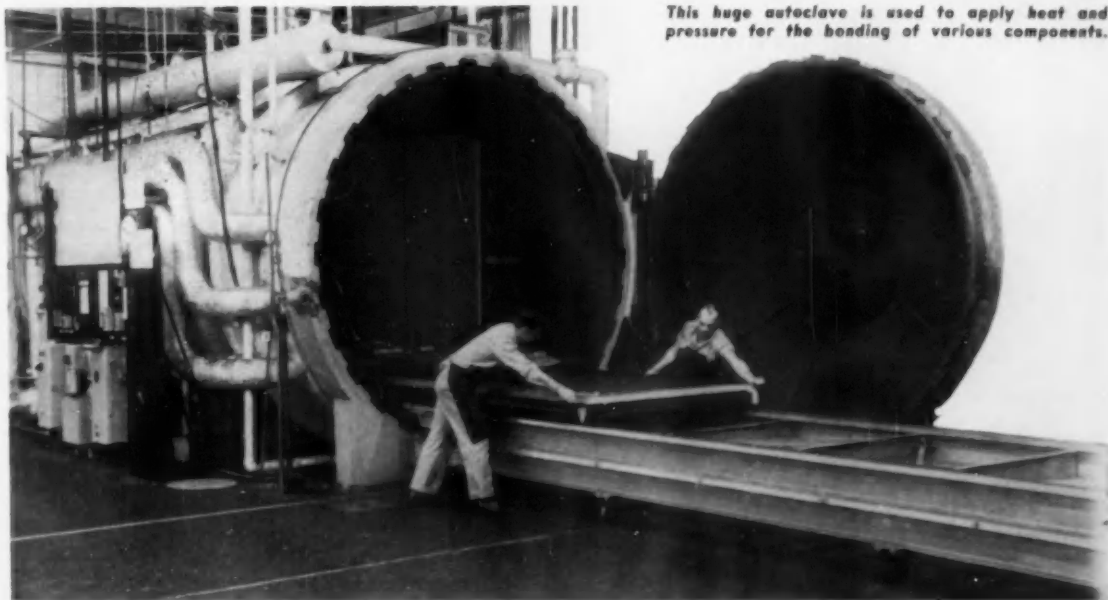
Each Matador wing is comprised of three bonded

aluminum sections: leading edge, trailing edge and center wing panel. Fabrication starts when three blocks of core are placed in wooden frames and sawed—in a single pass—forming airfoil contours, by a band saw developed especially for the purpose by Martin (see AI, June 15, 1953).

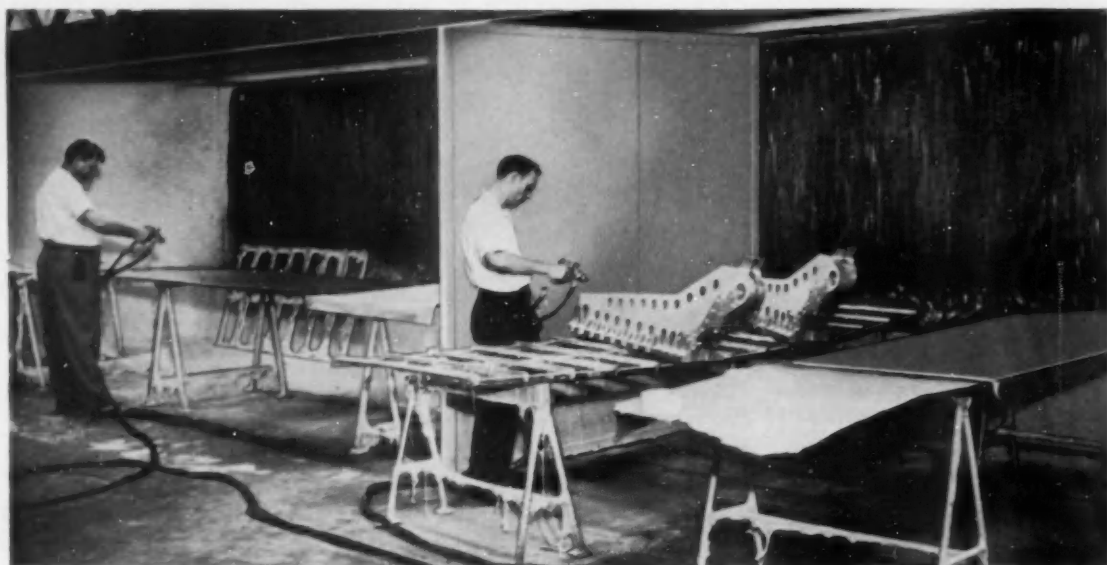
Skins of sheet aluminum for the three wing sections are rolled to contour after bonding. The skins or sheets for the center section are metal laminates of high strength—each consisting of several sheets of aluminum bonded in a platen press.

The entire wing assembly is finally placed in the overall bonding tool illustrated here. First, the casting is placed in the tool. The leading edge, center-section core and trailing edge are then set in position. Before closing the tool, the wing skins are set in place.

In each half of this tool are three pressure bags and three heating blankets—one set for each wing edge and another for the wing center. Connected to the tool are power packs, temperature controllers and recording pyrometers—with dials mounted on the portable tables to be noted in the background. The



This huge autoclave is used to apply heat and pressure for the bonding of various components.



Liquid adhesive is applied in these spray booths for the first operation. These parts will be first dried before final assembly.

two-hour bonding process results in a complete wing. Right and left wings are then joined by bolting the center castings together. This bolted splice is provided to facilitate transportation and to simplify the logistics problem.

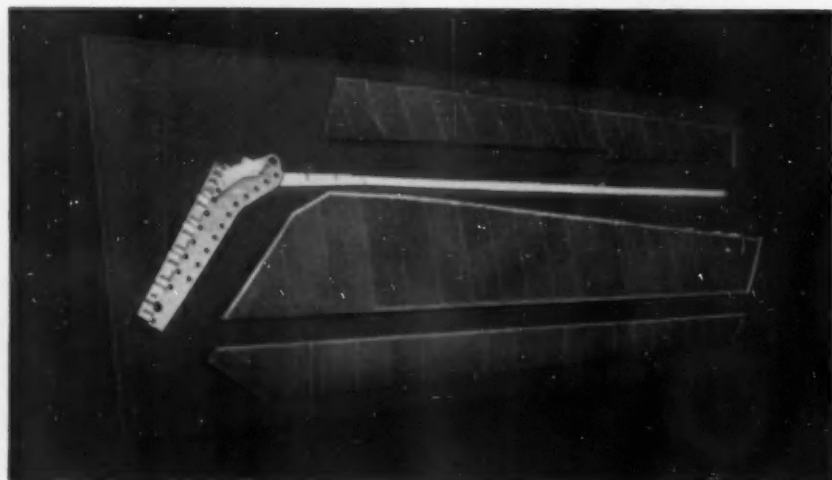
The Matador stabilizer, also a bonded assembly, has only thirteen parts. These parts—including the left and right-hand panels—are bonded into a fully integrated assembly, in a single operation—using a Martin electric-blanket bonding tool.

The strict quality control maintained throughout the manufacture of Marbond structures—once the materials have passed inspection—falls naturally into five divisions: (1) cleaning of details and adhesive

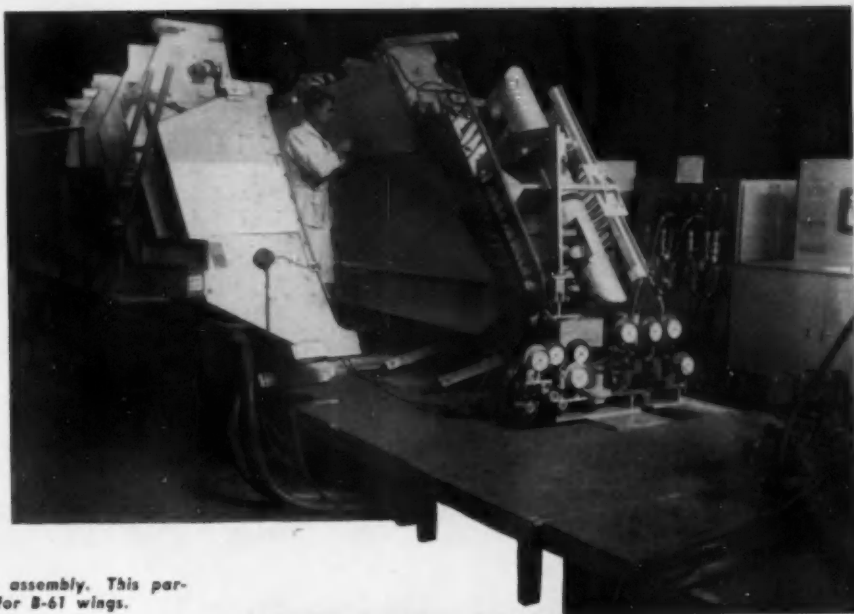
application; (2) drying of adhesives; (3) bonding of assemblies; (4) finishing; and (5) final inspection.

Marbond cores, as they come from the contouring tool, as well as edgings and inserts—are all carefully checked as to material and dimensions, prior to adhesive application. Facings and doublers are inspected as to the fit of the details to the assembly and tool—likewise prior to application of the adhesive.

Cleaning and spraying procedures are frequently checked by means of tests on shear specimens processed along with production. Adhesive coatings on cores are inspected for proper coverage. Coatings on facings and other detail parts are checked for smoothness, absence of blushing, proper thickness and area



Marbond assembly cores shown on this panel make up the major elements of the B-61 wing.



Electric blanket bonding tools such as the one illustrated are used to bond a variety of components into one Marbond assembly. This particular tool is used for B-61 wings.

covered. Care is taken not to damage details, nor contaminate them after cleaning and coating.

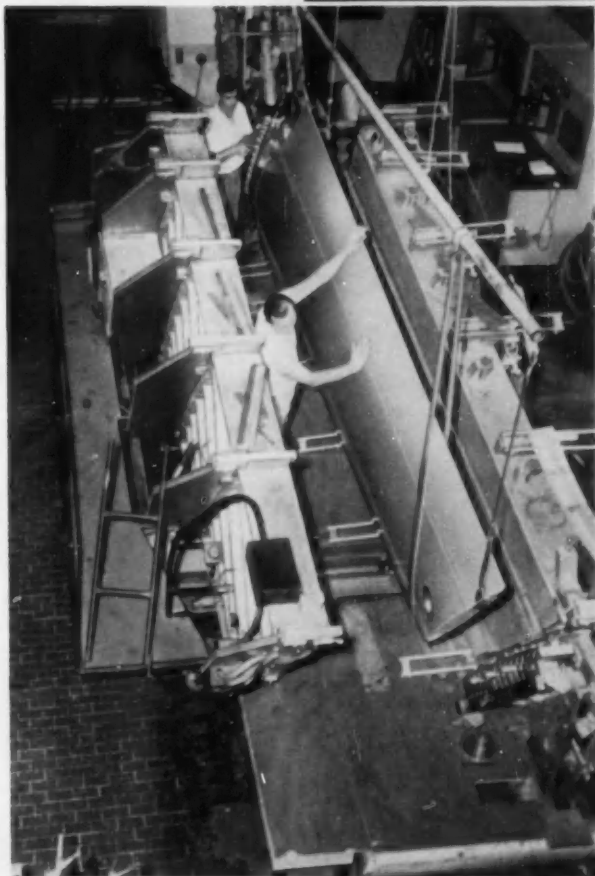
Coated details are inspected for proper air dry—and a check is made on the forced-dry schedule when this is required. Details of a structure are checked as to their acceptability and their positioning in the assembly and in the bonding tool. During the bonding operation, pressures, temperatures and time schedules are carefully recorded.

A periodic sampling of production parts also forms a part of the control. These samples are dissected to permit complete inspection of adhesive lines. Elements are used for destruction tests. Buttons are cut from the finished components for spot-checking and skin-to-core and metal-to-metal bonds. These are forced apart at the glue line and observed under the microscope for contact, adhesion, cure and porosity.

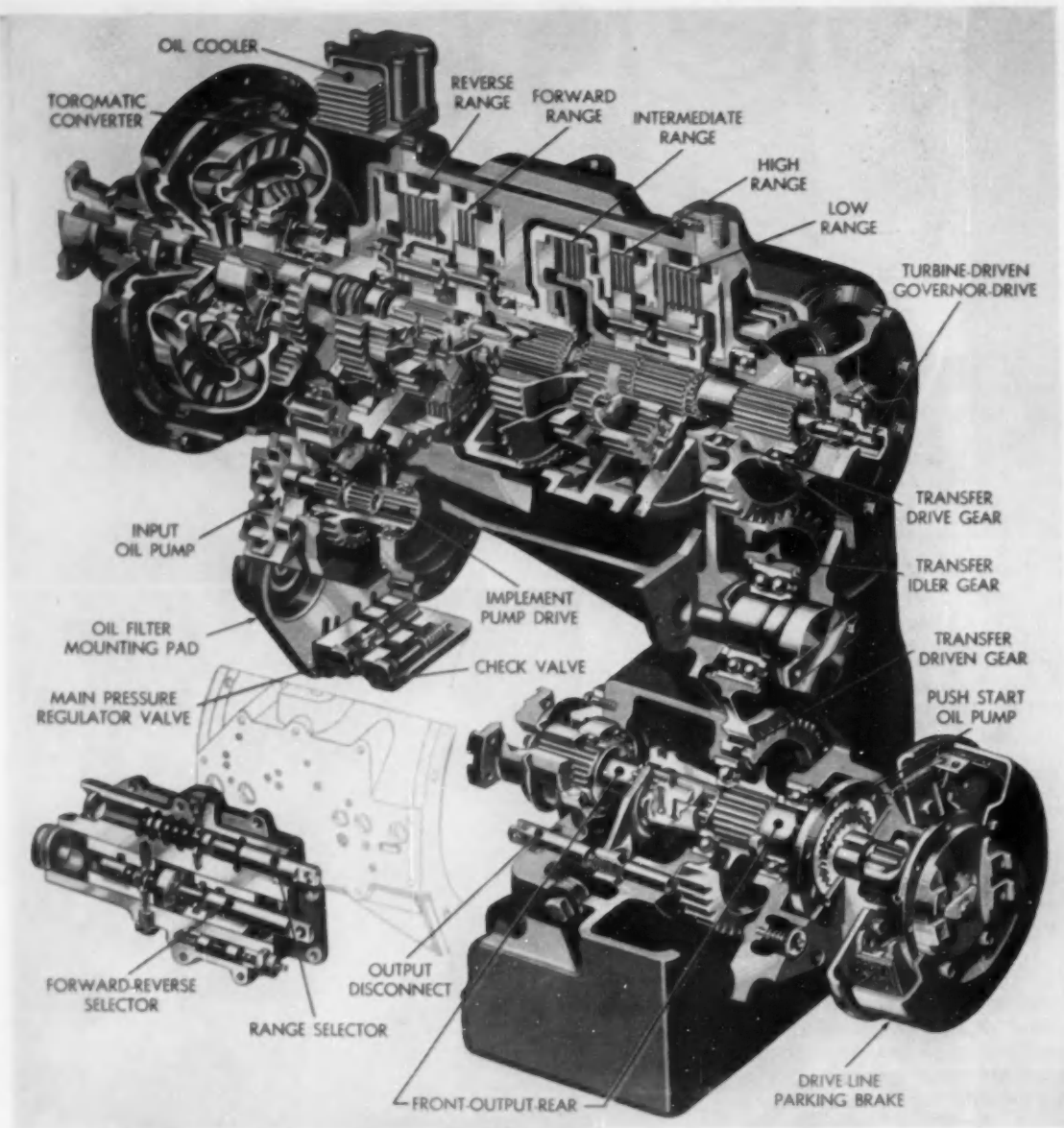
Improved Sealed Beams Going On All New Cars

The new improved type sealed beam headlamps now are being installed on nearly all new vehicles as original equipment. Necessary legislation legalizing the new lamps has been passed in all but two states.

In Georgia and Idaho, the lamps must be aimed at the old sealed beam specifications of three in. below horizontal rather than two in., as recommended for the new lamps in all states where they have been legalized.



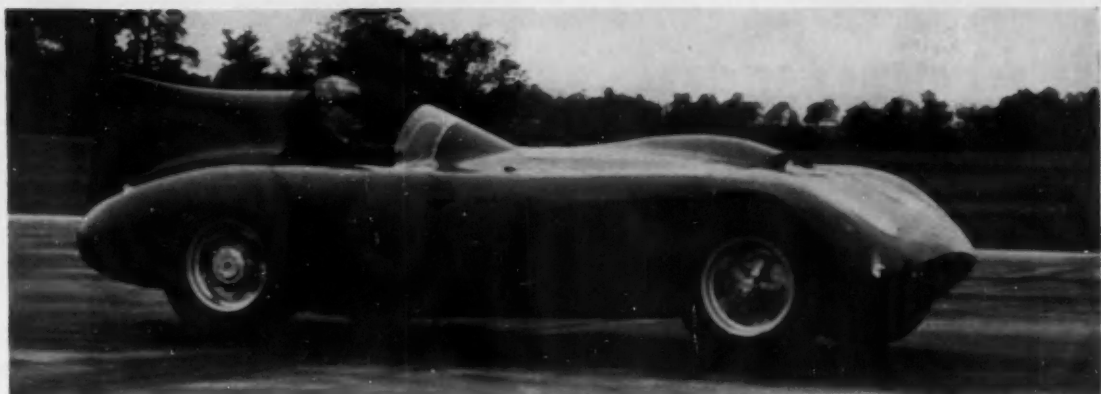
B-61 Matador wings are made in this special electric blanket bonding tool designed by Martin engineers. Parts can be Marbonded into a complete assembly in a single operation. Pressures and temperatures for each area of the part are separately regulated.



New Torqmatic Transmission for Industrial Vehicles

S HOWN here is a cutaway view of the new CRT-3330 Torqmatic transmission announced by Allison Division of General Motors for industrial vehicles, including loaders, graders and fork lift trucks. This three-in-one unit combines the Allison single-stage converter, the Allison "quick shift" range gearing and the transfer gearing drop box. Weights range from 1160 to 1310 lb, depending upon options. It is for use

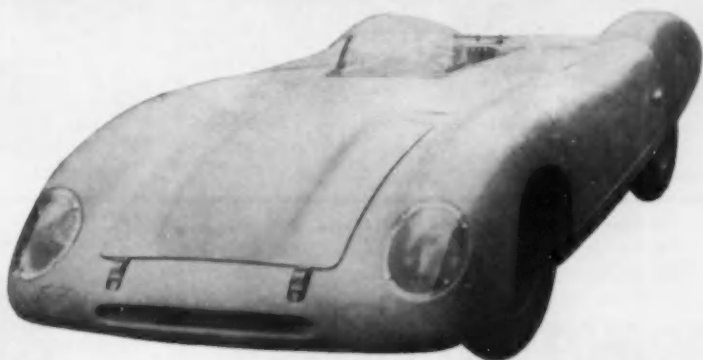
with gasoline or Diesel engines in the 70 to 130 hp class. It has three speeds forward and three in reverse. Options include two converter capacities, two implement pump drive ratios, filter, two transfer gear ratios, converter dry housing, disconnect for one output shaft, parking brake, governor drive, oil cooler and engine or remote mounting. Height 42 in., width 20 in., length 35 in. direct, 40 in. remote mounted.



Bristol with new competition body.

Below—Panhard with front drive, aircooled engine and central steering. Note the developed streamlining.

LATEST CARS at LE MANS RACE



PRESENTED here are a few of the interesting designs which were seen at the Le Mans race last month. A description of this event appeared on page 102 of the July 1 issue of **AUTOMOTIVE INDUSTRIES**.

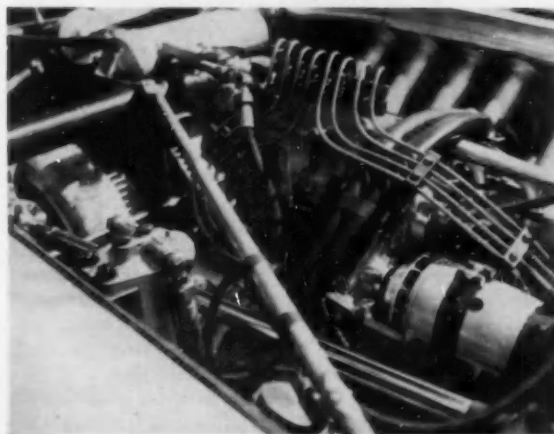
Aircooled models lend themselves readily to streamlining, a good example being the new Panhard. It has a 51.8

cu in. opposed twin aircooled engine with front wheel drive. This car has central steering, but the body being full width there is enough space left and right for the regulation size seat, both sides of which are covered over. On the full width of the leading edge there is a slot, less than four inches high, for air which is ducted around the cylinder barrels and discharged below. Because of this ducting the exhaust pipes are brought above the engine, then swept downwards to the rear.

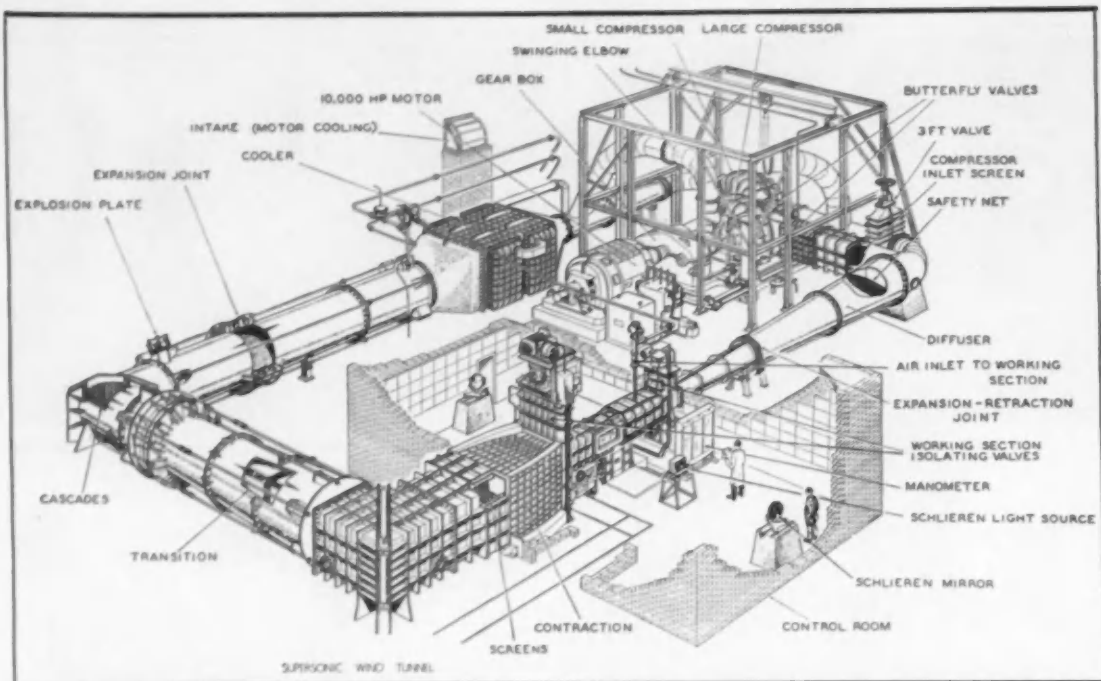
Mercedes cars were practically the same as those which won the recent Italian 1000 miles road race, with an inclined straight-eight engine of 78 by 78 mm bore and stroke (182 cu in.), featuring direct fuel injection with the Bosch system.

The Mercedes engine features central timing gear, which divides the engine into two blocks of four, the construction being a combined block and head of aluminum with wet liners screwed onto the combustion chamber end, the lower ends of the liners being sealed with rubber rings.

Bristol, along with several other makers, changed from a closed car to the open type. No closed cars were entered in the race this year.



Left side of Mercedes 8-cyl engine with fuel injection. Parts of the inboard front brakes are visible in this view.



Part cutaway view of the supersonic wind tunnel

WIND TUNNEL

For Future

Heat Barrier Problems

Small (1/16) in. model of a guided missile photographed by the Schlieren method with the wind tunnel running at Mach 2



BRITAIN's newest supersonic wind tunnel is capable of giving a continuous flow at speeds up to 2000 mph. It was developed by the Hawker Siddeley Group, and is located at the Armstrong Whitworth guided missile plant at Whitley, England. Mach range is 0.3 to 3.0, and main features are rapid starting and stopping, giving short running times, and low operational cost.

Circulating air is supplied by two centrifugal compressors driven by a 10,000 hp electric motor. Compressors work in parallel up to Mach 1.8, and in series at higher speeds. Motor starting sequence takes only

one minute, and supersonic flow through the working section can be established rapidly.

The compressors are started with their inlet butterfly valves closed. These can be opened or closed hydraulically in $3\frac{1}{2}$ sec, giving an almost instantaneous start and stop of flow through the tunnel. Abnormal stresses on the model are thus greatly reduced, and frequent model changes are facilitated.

The air drying plant eliminates water condensation and fogging in the working section and resultant temperature variations. During shutdowns dry air is trapped in the tunnel by means of isolating sluice

ARMSTRONG WHITWORTH SUPERSONIC TUNNEL PERFORMANCE

Basic Data

Mach No. range: 0.3 to about 3.0
Pressure range: Stagnation pressure from 0.2 atm to 1.5 atm absolute, and in certain cases to 2.8 atm abs.
Reynolds No. range: From 1×10^6 to 6×10^6 per ft at all Mach numbers above 1.6. Up to 10×10^6 in certain cases.
Incidence range: From -6 deg to $+45$ deg at all speeds.
Rolling angle range: From 0 deg to 200 deg at all speeds.
Longitudinal model position: 12 in. horizontal and vertical movement.
Motor: 7,700 hp continuous, and up to 2 hrs overload at 10,000 hp.
Amount of compressed air: 1.6 tons per minute at atmospheric stagnation pressure and Mach 1.9.
Volume flow: 59,000 to 200,000 cu ft per minute.
Cooling: 2,400 gallons of water per minute pumped from nearby river. Tunnel air can be dropped to below room temperature.
Floor area: 30,000 sq. ft.
Development cost: £200,000 (\$560,000)

valves. These operate in $1\frac{1}{2}$ min, after which the working section can be opened to atmosphere while the pressure and dryness of air in the tunnel are unaffected. A model change sequence thus takes only 5-10 min, and up to 12 useful readings per hour are possible.

Size of the working section is variable so that only one model of a given project is needed for testing at all speeds. A series of cast iron sections is used, with 20-in. width for up to Mach 1.8, and $14\frac{1}{2}$ in. for above. Five corresponding heights from 24 in. to 16 in. cover the full speed range.

Controls are grouped on an instrumentation console, and include six strain gage channels with associated power units, roll angle and incidence servo mechanisms, switches for the Schlieren system, and manometer camera. A second console houses a 22-channel printer on which all readings at any instant can be recorded simultaneously in triplicate copies.

The Armstrong Whitworth tunnel is conceived on a fully commercial basis, and will be rented to the Government and aircraft manufacturers on a scale calculated to make it self-supporting. Electricity costs are stated to be the equivalent of \$84 per hour, and it is expected that the hourly charge to outside users for testing time will average about \$280.

Hupp Plans To Sell

Hupp Corp. will sell its 200,000 sq ft stamping plant in Cleveland, O. Declining sales were attributed by the company for its decision to close the plant, which has been making air conditioning systems for furnace manufacturers.

Taxes vs Venture Capital

By Lothair Teetor

Assistant U. S. Secretary of Commerce
for Domestic Affairs

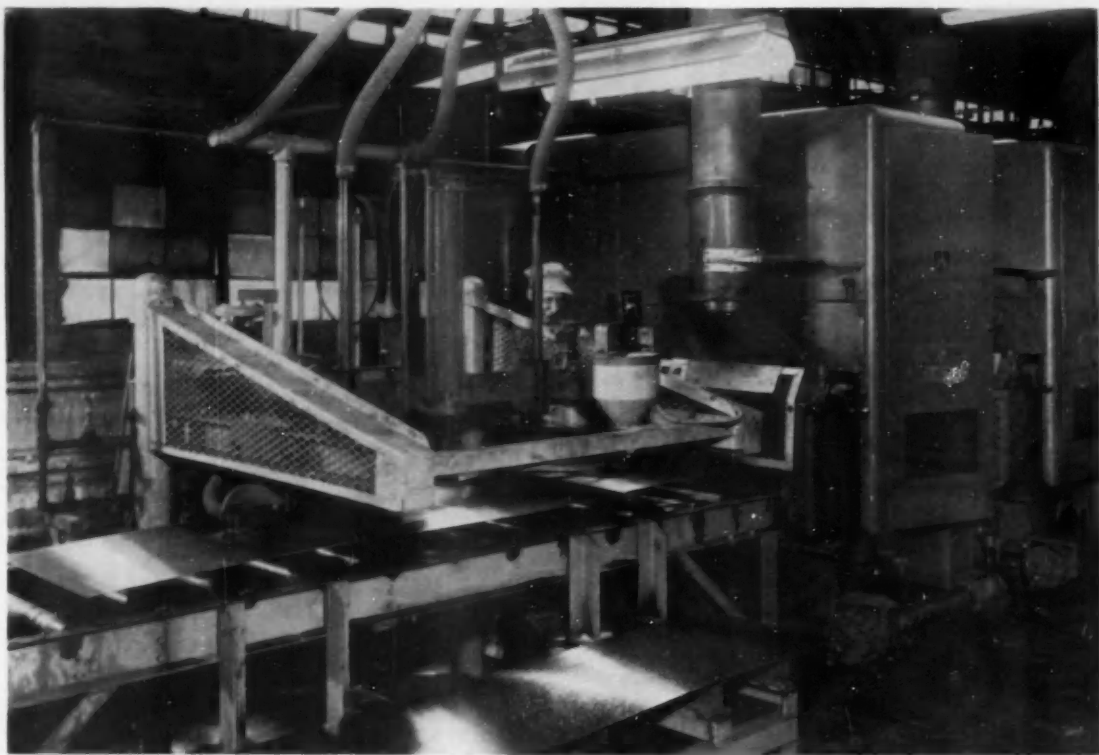
ONE of the things that is happening in American business today is that there is too little investment in new and growing business, because incentives are not commensurate with the risks involved. Highly graduated taxes, directed at both capital and income are tending to dry up venture capital, so important to new operations—particularly in the area of small and medium sized business. Essentially, the money that is being invested in expansion today is coming from well established firms, reinvesting their own profits, and from stock issued by these same established firms, usually large, where the element of risk is small.

The present surge of mergers with small and medium sized firms selling out to giants is largely due to our tax philosophy. Consider a business employing 500 people. It is probably worth five million dollars. The owners of such a business today would rather merge with a larger company, diversify their investment, have the opportunity to spend some of the money they accumulated, and pay the relatively smaller capital gains tax, than continue to operate their own business, and see most of their earnings taken by the tax collector.

Estate and gift taxes, raised to the point of confiscation, are also encouraging mergers. Owners of business are deterred from dividing their interests with their families because of high gift taxes. Upon death of the owner, it is frequently necessary to sell a large part of the business to strangers to pay the tremendous estate-tax. Rather than run the risk of having to sell a part of the business at an unfortunate time, to pay the tax and having to accept undesirable partners which might lead to failure of the business, the owners merge or sell out to a larger concern while they are still alive, thus safeguarding the savings of a lifetime for themselves, and their families, and insuring the continuation of jobs for the employees.

There is a definite trend today through mergers and inability of small firms to accumulate sufficient capital after taxes to grow into middle-sized firms, to reduce the number of our middle-sized, independently owned businesses. This is not a good direction. Continued over a period of years, we would end up with only two classes of businesses—very small, and very large, with nothing in between. There would be a mad

(Turn to page 146, please)



Vacuum pickup and transfer device used on the Hill Acme polishing equipment for raw steel stock. The product is inspected at this point and either sent on for further processing or rejected to the stand in the foreground.

Auto-Lite's Expanded Bumper Plant

LIKE many plants supplying automobile components on a large scale to an ever-expanding market, The Electric Auto-Lite Co. bumper plant in Sharonville, Ohio, has just recently completed a large expansion and modernization program. The job, which cost about \$2 million, entailed a complete rearrangement of production machinery within the plant buildings. This was carried out while maintaining a minimum of 50 per cent production.

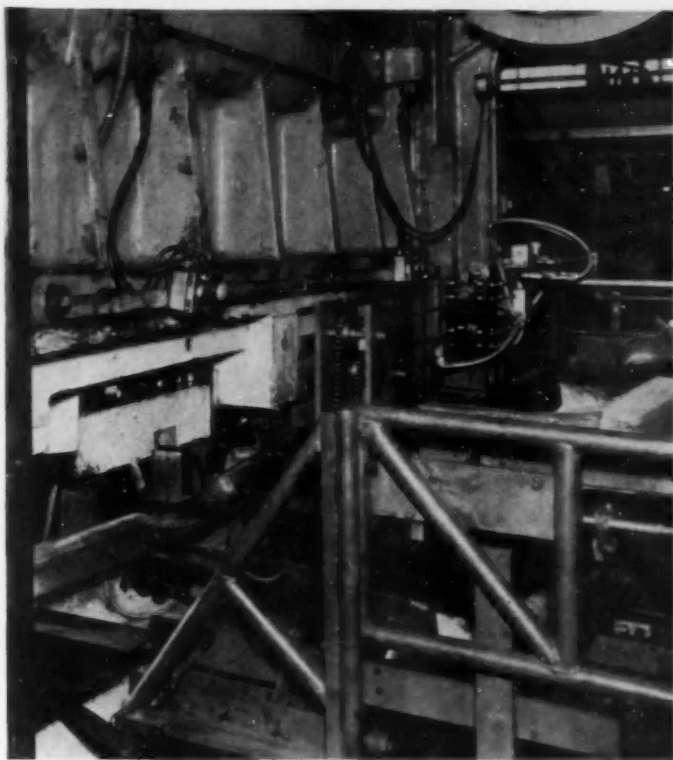
One of the features of the modernization program of this company, which manufactures about 14,000 bumpers and bumper supports per day for such cars as Plymouth, Dodge, DeSoto, Willys, Mercury, and another car soon to be placed on the market, is an automatic Meaker plating line. This new nickel strike line utilizes the skip transfer method of handling the bumpers between solutions.

Plant officials state that automation equipment installed in the plant was purchased from the standpoint of keeping the product of uniform quality as well as for higher production. Automated equipment

was installed primarily on the Plymouth bumper line and in some portions of the finishing department of the supports by Hamilton Automation, Inc.

Another innovation to the 10-year-old plant is a May-Fran underfloor central scrap removal system. This system is capable of handling two tons of scrap per hour. Currently, the scrap is shipped loose, but the company is working on a scrap baling device that will have the capacity for the heavy gage SAE 950 steel used for bumper production.

Some other new machinery purchased by the company includes four mechanical presses—one Clearing 500 ton, two Bliss 600 ton, and one Clearing 1600 ton—and a 16-head Hill Acme flat polisher. Also, during the program, the stroke and shut height of some of the previously used presses was converted. As a part of the plant rearrangement, two Lake Erie presses weighing 120 tons each were moved without being dismantled. The operation was carried out on a series of rollers mounted on tracks and using a powered winch as the prime mover.



Automatic feed constructed for the Plymouth bumper line by Hamilton Automation, Inc. Vacuum pickup is used with air cylinders and mechanical transfer.

Special Equipment Installed to Assure Continued High Quality of Product and to Increase Output

Raw bumper stock after being sheared to proper length, level rolled and stenciled, is automatically fed through Hill Acme machines for rough polishing. The feed into the machine is a vacuum pickup equipped with a limit switch which is adjustable to the stock size. At the start of the rough polish, 80 grit size belts are utilized; grit size becomes finer as the work progresses through the various machine heads. Generally, three different make belts are used by Auto-Lite; these are, Minnesota Mining, Behr-Manning, and Michigan Abrasive.

Transfer equipment between presses on the Plymouth bumper line. The automation equipment used is very flexible and can easily be removed from the line when necessary.



By
Thomas Mac New

A vacuum pickup is also used to stack the sheet steel as it leaves the roughing phase. As the piece comes out of the machine, it is given a 100 per cent visual inspection for surface flaws. If the piece does not pass inspection, it is rejected by the vacuum pickup device.

Similar operations as those previously described are performed on other Hill Acme machines for the finish polish. Quality control at the end of the process, however, is restricted to three per cent of the total product. For the quality check, a Brush Surfindicator is utilized. If the sample taken from the finished stock is not more than six or seven average microinches, the lot is passed on for production. Polishing belts are changed on the Hill Acme machines based on the Surfindicator reading.

The steel sheets are washed and then passed through a Ransohoff machine where the steel is Bonderized and soap coated for the press operations.

Altogether the plant has 14 presses for bumper operations. There is one

line of six presses, and there are two lines of four presses each. Out of this number 11 are Bliss and Clearing mechanical units and three are Lake Erie hydraulics.

The press line manufacturing Plymouth bumpers has been completely automated by Hamilton Automation, Inc. Sheet stock on this line is loaded by a vacuum pickup and air actuated cylinders. The entire setup between presses is integrated electrically. At the end of the line, the bumpers ride a belt conveyor to a manual pickup station where they are transferred to an overhead conveyor which transports them for further processing.

On all three lines, the presses are set up to manufacture two bumpers per sheet of steel. During the drawing operations, there are approximately three to 10 per cent rejects depending on the steel used and the contour of the bumper. One of the most interest-



Meeker automatic skip transfer plating line for the initial nickel strike. All carriers except one at the middle of the unit are loaded in the tanks.

ing tools used on the press line is the die for trimming the top and ends of the bumpers. After the trim die closes, there is a cam action which joggles the die to shear off the excess metal. The job is so clean that extra operations such as grinding or polishing are not necessary.

When the bumpers leave the press line, they are

Maintaining the Automated Plant

By N. Conrad

Supt. of General Maintenance
Ford Motor Co., Cleveland Engine Plant No. 1

IN the past, machinery or equipment was not repaired until it had broken down. This approach is not satisfactory today. Ford's entire production system is geared to a uniform production rate per hour with little possibility of making up lost production due to breakdowns. Constant productive maintenance is the key to uninterrupted high quality production. It was found that to gain fast, efficient maintenance service in Ford's Cleveland Engine Plant, decentralization of maintenance activities was a must.

In the past, maintenance headquar-

ters were located in one central area with most of the trouble calls coming to that point. Experience soon showed this to be a very costly manner in which to operate this type plant. It was found that skilled trades demanded a higher degree of versatility than could be acquired without many more years of experience and training. This was due to the complexity of the equipment plus the different types of machine tools and varied operations. It was also found that the waiting period from the time the machinery or equipment went down to the time the repair-

man reached the scene was excessive, thus raising costs of that department and leading to an inefficient operation. Therefore, instead of having one central shop trying to service this million sq ft plant, the plant has been divided into five "productive maintenance" areas. Each area has one man responsible for all the maintenance of that area over a 24 hour period. He, in turn, has foremen on each shift responsible to him. The men required to run these departments are chosen for their ability to keep them in first class condition and recognize the signs of threatening trouble. Hourly workers are also assigned to each specific area. With this arrangement, both supervision and hourly personnel are thoroughly acquainted with the equipment, and top efficiency is obtained. By having constant productive maintenance



Left—Bumpers coming off the end of the Meaker skip transfer plating machine. Right—One of the bumper trim dies having a cam actuated movement for shearing the excess metal.

conveyed to the Meaker automatic skip transfer nickel plating machine. This unit finishes a 1500 lb load every 65 seconds for the initial nickel strike. The bumpers receive a total nickel plate of 0.0015 in three passes—once through the Meaker and twice through semi-automatic lines. Timing for all three lines is based on the nickel strike of the Meaker. Principle of the skip transfer system is that if one tank of the unit is loaded, the overhead conveyor carries the next batch of bumpers past that tank and deposits the load in a similar tank. There are 17 stations in the Meaker unit; basically these are: load, soak, rinse, electrolytic clean, rinse electrolytic acid, rinse, nickel strike, rinse, and unload.

The various operations of the Meaker are tied together with an Allen Bradley control panel which

utilizes a wide variety of limit switches, latching relays, and timers.

All parts leaving the Meaker automatic plating machine are manually unloaded and then loaded on a Cleveland Tramrail overhead hoist for the semi-automatic lines. The bumpers are moved through the line manually.

Following the nickel plate operations, the bumpers are buffed using Hill-Acme, Murray-Way, or Auto-Lite rotary or straight-line equipment. The chrome line in the plant is similar to the semi-automatic nickel lines with manual load and automatic tanks. Throughout the final phases of manufacture all bumpers receive a 100 per cent visual inspection. All plating baths are under laboratory control to further assure proper plating thickness and quality.

on machinery and equipment, any perishable parts that must be stocked for special equipment and machine tools along with standard maintenance stock are soon determined.

In an automated plant with the latest techniques of manufacture and productive maintenance, it was found that the original records system for gaining historical data was outmoded.

In the past it has always been a great problem to analyze maintenance costs accurately. Vast sums of money have been expended to keep machinery and equipment in operating condition; but, at no time, was it ever possible to determine exactly how much any one particular job did cost. Therefore, it was deemed advisable to apply the benefits of an IBM installation to this phase of plant operating costs.

With this installation, maintenance

data on any machine, by trade, for any period of time can be obtained at a moment's notice.

After a final decision was made on a feasible plan of practical cost control, a new department was established with a cost accountant for its supervisor and two clerks for maintaining proper flow of cost information.

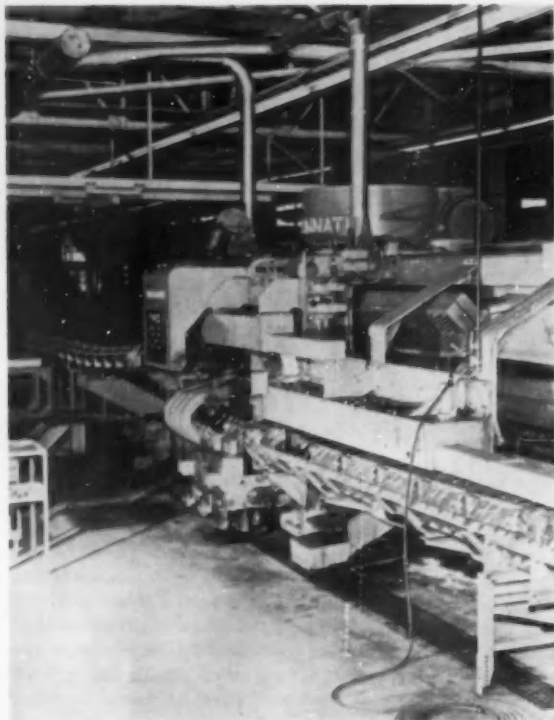
The cost accountant's most important job was getting proper information for recording. It was decided to use a form on which an hourly worker filled in the time and nature of any job taking a half hour or more—anything less than this is considered routine and is covered by a blanket general charge number at the end of the day. This newly created form is then signed by the foreman and used in filling out his time sheet. Each piece of machinery and equipment has an

assigned accounting number painted on it. Each trade classification has a list of downtime reasons assigned with a code number to cover each reason. Then, to fully cover complete cost of repairs, each stock requisition written must have the machine or equipment number on it before being honored by the crib attendant.

To get this system in operation, classes were conducted by the cost accountant for maintenance and production supervisory staffs. After their complete orientation, groups of each hourly maintenance skill were given similar instructions in the systematizing of machine costs. Inasmuch as the hourly man represented the difference between success or failure of the program, a great deal of time was spent with him in evaluating the bene-

(Turn to page 194, please)

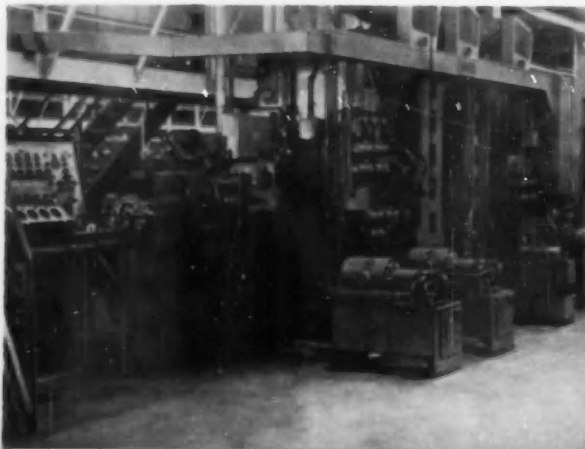
Canadian Plant Turns Out V-8 Engines



Perspective of enormous Cincinnati surface broaching machine at start of cylinder block line. It has a mechanical plunger drive for ram actuation, powered by a 350-hp motor-generator.

Below—One section of the enormous Sandstrand transfer machine on cylinder blocks. Attention is drawn to the accessibility of the Vickers hydraulic pump units, mounted in line along one side as shown, making it a simple matter for maintenance men to reach all parts of the equipment.

Below right—First section of the large Cross Transfer-matic installation on the cylinder block line. Master control is seen at far right.

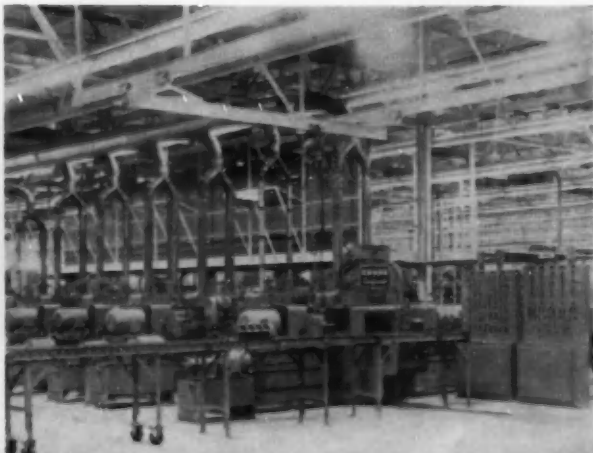


To the rising tide of new V-8 engine plants recorded recently we can add the facilities of The McKinnon Industries, Ltd., St. Catharines, Ontario—Canadian subsidiary of General Motors Corp. Designed to produce 35 V-8 engines per hour, it has a floor space of 370,000 sq ft and is integrated with a fully mechanized foundry of advanced type having a productive floor space of some 375,000 sq ft.

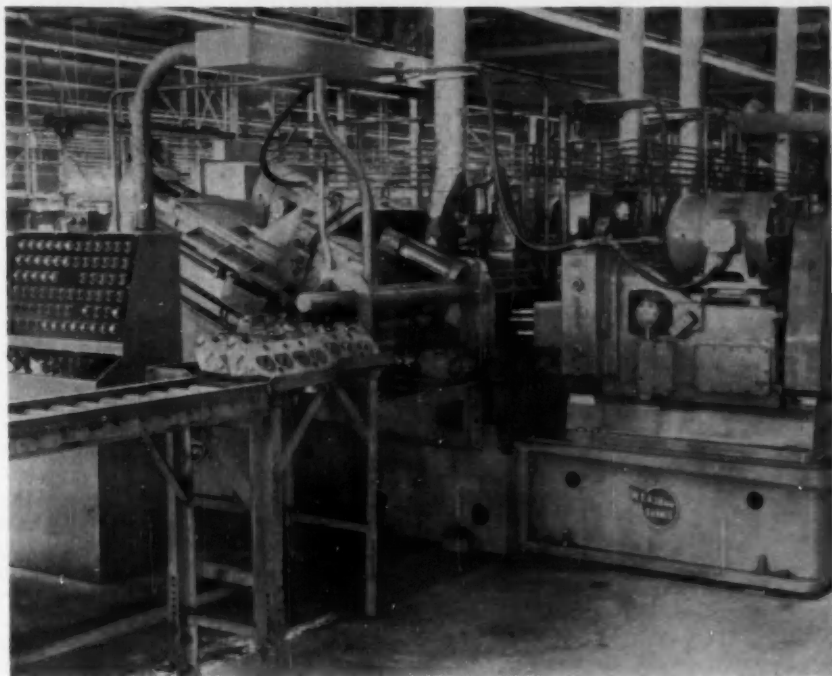
Principal function of the new engine plant is to provide Canadian GM car assembly facilities with V-8 engines for Chevrolet, Canadian Pontiac, and Oldsmobile. The productive capacity of 35 engines an hour refers exclusively to the basic engine used in Chevrolet and Pontiac cars. Oldsmobile V-8's are assembled and hot-tested using balanced parts shipped from Oldsmobile in Lansing.

Even casual observation of these engine manufacturing facilities reveals that McKinnon may well boast of the most advanced type equipment known to the art, vying with the newest plants in the U.S.A. from the standpoint of modernity, mechanization, arrangement, and housekeeping. This estimate is even more impressive when one takes into account the lower production goals.

It is a relatively simple matter to establish its modernity. Suffice it to say that the major items of equipment bear the same familiar brand names, represent the latest designs of each well-known machine tool builder. In addition to enormous transfer machines and complete mechanization designed to eliminate all manual handling, McKinnon has an extensive installation of the well-known Jervis B. Webb power-and-free



With Latest U.S. Type Machine Tools



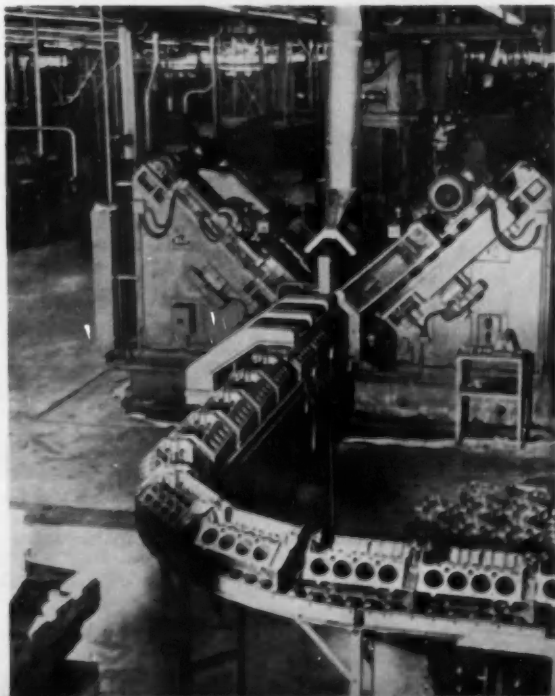
PART I of a Two-Part Article

By
Joseph
Geschelin

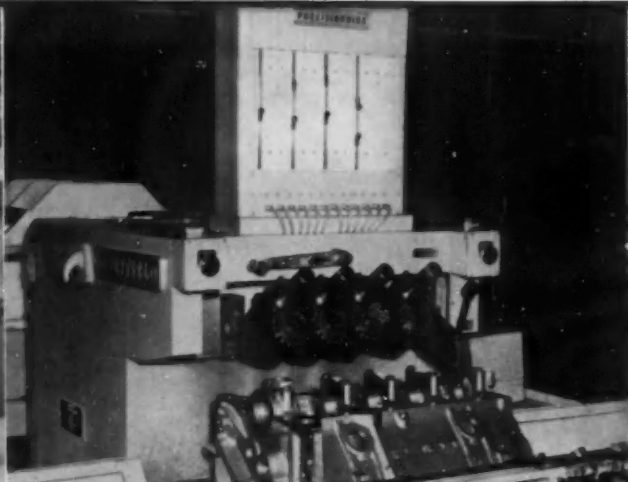
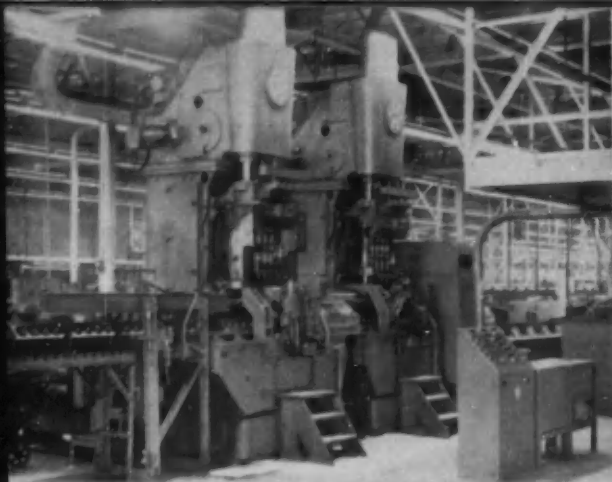
This is a view at the loading station of the big W. F. & John Barnes transfer machine for the variety of operations required in finishing cylinder heads

conveyor system. Controlled by a large master board, this system picks up engines at the end of the assembly line, transports them on individual carriers to engine balancing, to the hot-test, and to the shipping dock. In addition, the system contains a network of power-free storage conveyors on which engines are stored for use on second—and third shifts if need be—for balancing, hot-testing, and shipment.

Although all of the equipment deserves special treatment, it is noteworthy that McKinnon has in operation one of the largest single installations of Cross Transfer-matics to be found anywhere. We refer to the 350-ft long unit for machining cylinder blocks and single it out only



View of Ex-Cell-O precision boring machine for finishing cylinder bores ahead of honing. Size is held to a tolerance of 0.0002 in. in this machine.



Left—Vertical spindle type Micromatic boring machines handle the honing of cylinder blocks. Right—Here is the Sheffield Precisionaire gaging machine for inspecting and grading cylinder bores one bank at a time. In the center may be seen the device for marking the cylinder bore grade.



Top—Rear side of one section of the Baker transfer machine for finishing main bearings.

Bottom—View of one end of the Krauger-Barnes transfer machine for drilling oil holes in crankshafts.

because the machine was given feature treatment in *AUTOMOTIVE INDUSTRIES*, December 1, 1954. At the time this machine had been shipped to Canada but Cross could not divulge the name of the customer.

It is made up of five distinct sections, each of which can operate independently if need be in the event of a shut-down or when tool changes are being made. As installed, the machine is found in two parallel lines with Sections 1 to 3 inclusive forming one line, Sections 4 and 5 forming the other. The two lines are interconnected by an automatically cycling conveyor at one end.

The Cross machine is fully automatic in operation, and features built-in inspection stations and roll-overs. In addition, it has two automatic inspection stations for checking the oil-tightness of oil galleries. The first of these inspects the main oil galleries. During this cycle, the galleries are plugged at both ends, then subjected to high air pressure for detecting the presence of leaks using dial gages. If the block is a leaker—and that is a rarity—the unit will automatically initiate a spray gun that sprays yellow paint on one end of the block for ready identification. Later on, another station checks the high pressure line in similar fashion.

Reference to the previous article will provide rather complete details of the overall operation of the machine.

Consider now a highspotting of machine lines. Cylinder blocks are broached in an enormous horizontal Cincinnati surface broaching machine similar to the one described in connection with the Chevrolet V-8 engine plant in Flint. It broaches the two banks and deck at one station; the pan rail, bearing locks and bearing half-around bores at the other. The same basic machine is found at the start of

(Turn to page 120, please)

over
8000
Different Cylinder
SELECTIONS-



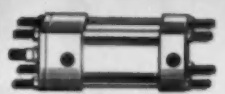
AIR AND
HYDRAULIC

CYLINDERS AND BOOSTERS

"IN STOCK"

for immediate delivery.

See Miller Bulletins A-105K (Air) and H-104K (Hydraulic) for Complete Dimensions and Engineering Data on these "in-stock" sizes and other Custom Miller Cylinders in bores up to 20" and strokes up to 22 feet.



A50 & H50—Tie Rods not extended beyond nuts.
A51 & H51—Tie Rods extended both ends (shown).
A52 & H52—Tie Rods extended, Cap End only.
A53 & H53—Tie Rods extended, Rod End only.
A54 & H54—Two Tie Rods extended at both ends.

"IN-STOCK" MODELS

"A" Signifies Miller 2000 psi Air Cylinders; "H", 2000 psi Hydraulic Cylinders. Interchangeable Mountings Are Shown in Red On Drawings.

 A61 and H61 Flange Mounting on Rod End (A61 not available in 8" bore)	 A62 and H62 Flange Mounting on Cap End (A62 not available in 8" bore)	 A63-8" Bore only Flange Mounting on Rod End	 A64-8" Bore only Flange Mounting on Cap End		
 H65 —Hydraulic Only Flange Mounting on Rod End	 H66 —Hydraulic Only Flange Mounting on Cap End	 A72 and H72 Side Lug Mounting	 A74 and H74 Side Flush Mounting	 A77 and H77 Side or Foot Mounting	
 A81 and H81 Trunnion Mounting on Rod End	 A82 and H82 Trunnion Mounting on Cap End	 A83 and H83 Trunnion between Head and Cap (one week delivery)	 A84 and H84 Pivot Mounting	 A86 and H86 Pivot Mounting	

**I
N
S
T
O
C
K
B
O
R
E
S**

BORES	ROD DIA.	ROD TURN DOWN & THREADS	"IN-STOCK" STROKES (in inches)																							
			1 1/2	2	2 1/2	3	3 1/2	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
A I R	1 1/2	3/8"	3/8-20	Cushioned			3	4	5	6	7	8	9	10	11	12										
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12										
	2	1/2"	3/8-20	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	2 1/2	5/8"	3/8-20	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	3 1/4	1"	3/8-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	4	1"	3/8-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
H Y D R A U L I C	5	1"	3/8-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	6	1 1/8"	1-14	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	8	1 3/8"	1-14	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	1 1/2	3/8"	3/8-20	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	2	1"	3/8-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
H Y D R A U L I C	2 1/2	1"	3/8-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	3 1/4	1 1/8"	1-14	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	4	1 3/4"	1 1/4-12	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	5	2"	1 1/2-12	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	

① "A" and "H" Models 82, 84 and 86 with strokes over 18" require stop tubes.

Column strength requires larger diameter piston rods for the following:

Air Cylinder Models 82, 84, and 86 with strokes inside area (1), when operated at 100 psi and over;

All hydraulic models with strokes inside area (2) and Models 82, 84, and 86 with strokes in area (4), when operated at 2000 psi and over;

Models 82, 84 and 86 with strokes inside area (3), when operated at 1000 psi and over.

Depending upon Trunnion Pin location, "A" and "H" Models 82 with standard diameter piston rods can have longer strokes than Models 82, 84 and 86.

See Miller File #251 for oversize piston rod and stop tube requirements.

BOOSTERS IN STOCK

Immediate Delivery on the following Miller 25 to 1 Ratio Boosters (80 psi air input produces 2000 psi hydraulic oil output): Model B4, 5" bore, 1" dia. ram, 6" and 12" strokes; Reciprocating Booster Model DA77-REAB, 5" bore, 1" dia. ram, 6" stroke. Also Booster Tanks, 5" dia., 6" and 10" heights.

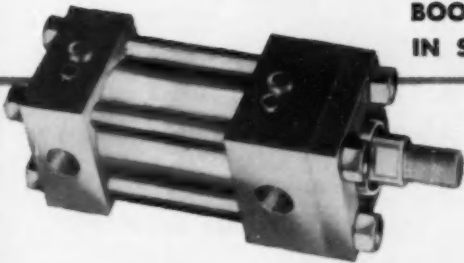
Write For Catalog
and Stock Price List



MILLER FLUID POWER CO.

2028 N. Hawthorne Ave., Melrose Park, Ill.

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS



POTTER & JOHNSTON

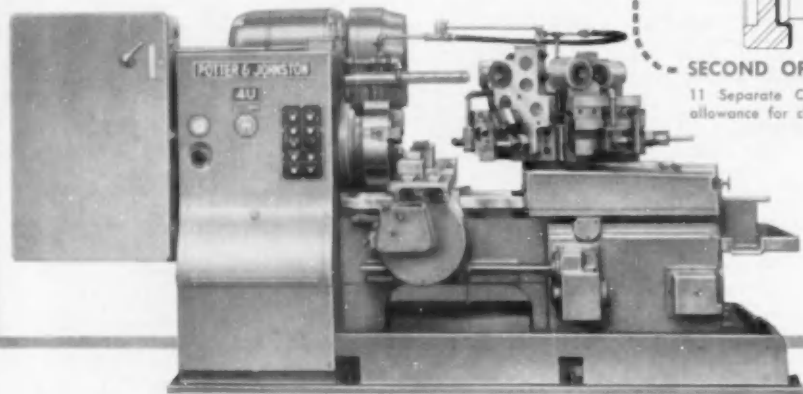
4-U AUTOMATIC TURRET LATHE

Handles **TOUGH STEEL FORGINGS**

Quickly . . . Economically

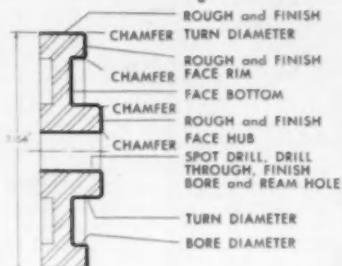
Jobs like machining this change gear blank, forged from 6150 steel, including boring the 1 1/8" hole *from the solid*, are easy, fast, profitable. That's because the P&J 4-U is a *modern* machine with the advanced design, added rigidity, and extra speed and power to take today's tough steels in stride.

**WITH TOOLING
ENGINEERED BY P & J EXPERTS**



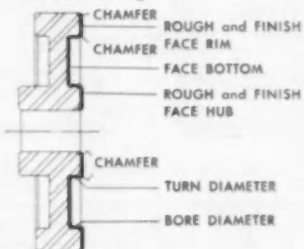
SEE US AT SPACE 1219

THE
MACHINE TOOL
SHOW
CHICAGO, ILL.
SEPT. 9-17, 1955
INTERNATIONAL AMPHOTHEATRON



FIRST OPERATION

17 Separate Cuts, 3.41 minutes including allowance for chucking



SECOND OPERATION

11 Separate Cuts, 2.56 minutes including allowance for chucking



TAKE ADVANTAGE OF DIRECT-FACTORY SERVICE

To serve you best, all P&J Automatics are made available to you through Potter & Johnston and Pratt & Whitney direct-factory Representatives. For full information on the 4-U and other P&J Automatics . . . plus expert application engineering . . . phone or write the P&W Branch Office conveniently near you.

POTTER & JOHNSTON Co.

PAWTUCKET, RHODE ISLAND

SUBSIDIARY OF

PRATT & WHITNEY

DIVISION NILES - BEHNKE - FORD COMPANY

BIRMINGHAM • BOSTON • CHICAGO • CINCINNATI • CLEVELAND • DETROIT
LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • ROCHESTER
SAN FRANCISCO • ST. LOUIS • EXPORT DEPT., PAWTUCKET, RHODE ISLAND
AGENTS: DALLAS, THE STANCO CO. • HOUSTON, WESSENDORFF, NELMS & CO.

PRECISION PRODUCTION TOOLING

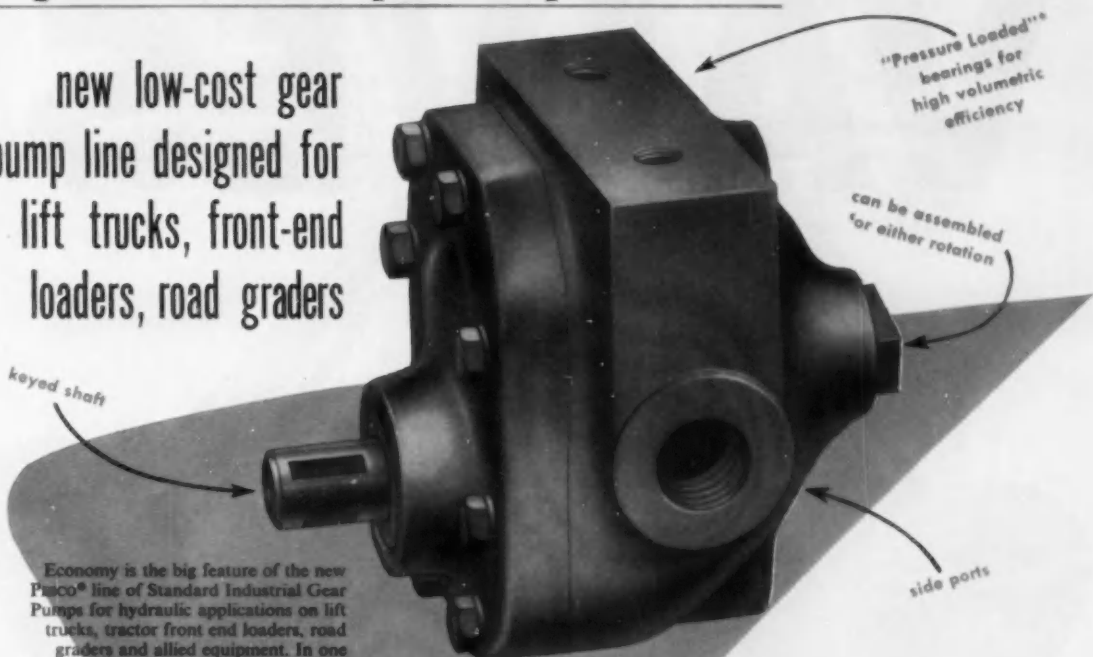


FOR MORE THAN FIFTY YEARS

New from Pesco!

standard industrial hydraulic pumps . . .

new low-cost gear pump line designed for lift trucks, front-end loaders, road graders

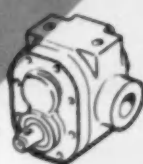


Economy is the big feature of the new Pesco® line of Standard Industrial Gear Pumps for hydraulic applications on lift trucks, tractor front end loaders, road graders and allied equipment. In one standardized body casting, Pesco can give you a choice of three displacement sizes and three mounting arrangements at a price you will want to investigate.

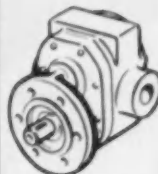
And these pumps are not built down to a price. They are Pesco quality in every aspect of design and manufacture. For example, they incorporate Pesco's patented "Pressure Loaded" bearings for maximum efficiency and sustained new pump performance throughout an extra-long service life.

If you want to build superior hydraulic performance *plus* economy into your off-the-road or materials handling equipment, get the full story on these new Pesco Pumps. Contact your local Pesco sales engineer or write: PESCO, 24700 North Miles Road, Bedford, Ohio.

three convenient mounting arrangements:



base



round flange



magenta flange

available in three popular capacities:

Pump Model Series	Rated Flow GPM	Displacement Cu. In.	Pressure PSI	Rated Speed RPM
051002	10.0	1.32	2000	2000
052973	12.0	1.56	2000	2000
052941	16.0	1.93	1500	2200

*Pesco's patented principle of gear pump construction.



BORG-WARNER CORPORATION
24700 NORTH MILES ROAD • BEDFORD, OHIO

EATON VALVES



PLAIN
VALVES

FREE
VALVES

SODIUM-COOLED
VALVES

EATONITE-FACED
VALVES

**Longer Valve Life for ALL Engines
in ALL Types of Service**

EATON MANUFACTURING COMPANY

General Offices: CLEVELAND, OHIO

VALVE DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN



PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

Assembly operation eliminated

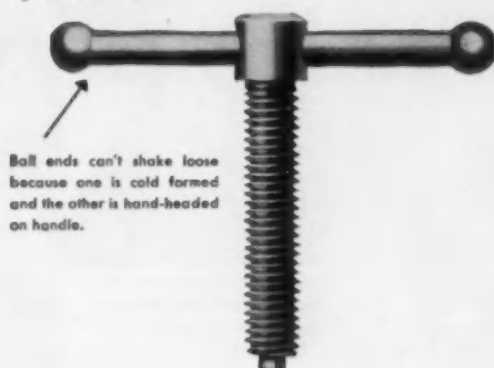
The old way:

This vise handle was originally cut from bar stock by screw machine. One end of the handle was threaded while the other was machined to a ball head. To complete the assembly a separate internally threaded ball head had to be screwed onto the threaded end by hand.



The National way:

Our "Special Products Service" showed how this vise handle could be produced faster and at lower cost by cold heading. The handle and one head were cold formed to required dimensions. Then, the handle was inserted through the drilled hole in the head of the jaw adjusting screw and the other end was hand headed. Result... substantial savings in material and production costs.



Bring your "Special" problems to National

National has the experience and wide range of cold heading equipment needed to solve many "special" problems. Our "Special Products Service" representative will be glad to study your requirements. Write for free copy of National's "Special" fastener booklet.

REPRESENTATIVES IN:

Chicago
Cincinnati
Denver
Detroit
Indianapolis

Kansas City, Mo.
Lansing
Milwaukee
Minneapolis
New York

Philadelphia
Rochester
San Francisco
Seattle
St. Louis



THE NATIONAL SCREW & MFG. COMPANY Cleveland 4, Ohio

Pacific Coast: National Screw & Mfg. Co. of Cal.
3423 South Garfield Ave., Los Angeles 22, Cal.



Fasteners



Model Chains



Chester Hoists



Never a shutdown to oil this Welsh Plug machine because Farval's on the job

**FARVAL—
Studies in
Centralized
Lubrication
No. 175**

THIS machine drives seven Welsh Plugs into the block of a well-known automobile engine. Uninterrupted operation is essential to its smooth performance as part of the automated line.

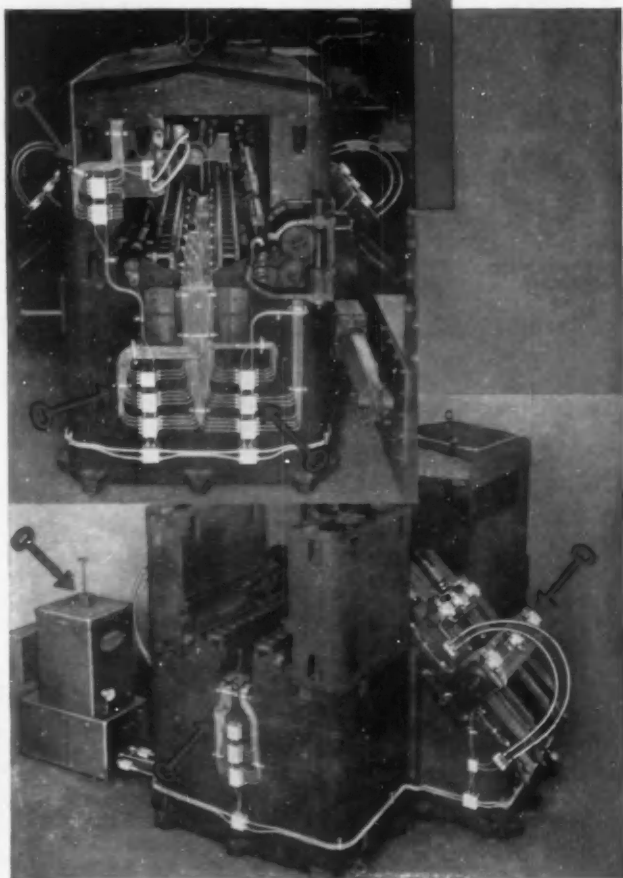
That's the reason the builder installed Farval Centralized Lubrication. These photographs were taken before final assembly of the machine, to show the extensive, orderly arrangement of Farval lubricant lines and valve manifolds serving 207 vital bearings—failure of any one of which would cripple the operation.

Now in service, the Farval system lubricates the machine automatically from the pumping station located at the left. It delivers a measured amount of oil to each bearing, as often as desired, while the machine itself is operating. Never a shutdown for lubrication! And no special oiler is needed.

Farval Automatic Lubrication is the ideal system for automation in any industry. The Farval Dualine valve placed at each bearing is simple, sure and foolproof—only two moving parts, without springs, ball-checks or pinhole ports to cause trouble. Its value proved by more than 27 years of successful service, Farval lubricates millions of industrial bearings.

Let us send one of our lubrication engineers to analyze your plant equipment and help you determine how Farval can serve you. Just drop us a line. Ask also for Bulletin 26. The Farval Corporation, 3296 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.



KEYS TO ADEQUATE LUBRICATION—Wherever you see the sign of Farval—the familiar central pumping station, dual lubricant lines and valve manifolds—you know a machine is being properly lubricated.

These photographs of a Welsh Plug Assembly Machine, showing Farval lines and valves on both sides, by courtesy of the builder, Sainte Claire Tool Company, Detroit, Michigan.



News of the MACHINERY INDUSTRIES

By Thomas Mac New

Orders Going Up With Bright Future

Machine tool orders during May went right up to a new 21-month peak. Business for the first five months of '55 is now \$310 million with May accounting for \$72 million.

Passenger car makers, now in the midst of the biggest expansion programs in history, are leading the way with equipment purchasing and orders are expected to be on the increase.

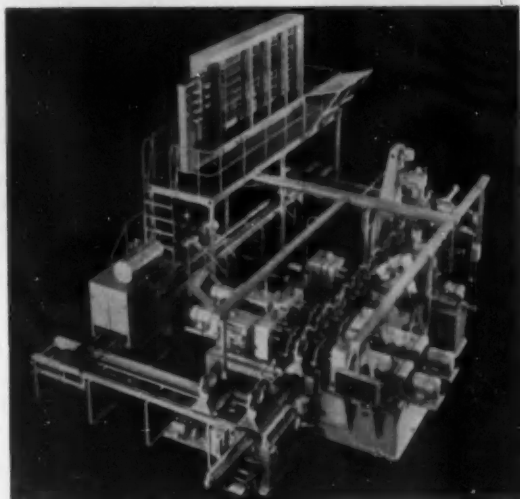
Even the Government is once again on the machine tool bandwagon with the Air Force releasing the purse strings on \$11 million for milling and broaching machines. There's still \$89 million more to go under the current budget for the Armed Services and most of this will probably be spent during the remainder of the calendar year. Companies getting the Air Force award—first to be made under the current setup—are: Onsrud Machine Works; Farnham Div., Weisner-Rapp Co.; Colonial Broach & Machine Co.; and Lapointe Machine Tool Co. Another \$100 million has been voted for machine tools for fiscal '56.

Services for NMTBA Show

Six companies in the tool, cutting fluids, and lubricants field will be a part of the "Greatest Show on Earth" at Chicago this September. These companies will supply the needs of machine tool companies exhibiting at the multi-million dollar affair. Two of the firms—Carboloy and Kennametal—will handle carbide tooling. The other four—Anderson Oil, Houghton, Socony-Vacuum, and Sun Oil—will take care of the petroleum and allied products.

E. F. Houghton & Co. reports that it will have free service, including installation of cutting fluids, lubricants, and hydraulic fluids in operating equipment. It will also show metal cleaners and rust preventives, and the products will be available to machinery exhibitors. Houghton's management states that over half the exhibitors at the 1947 show availed themselves of Houghton service.

This 12-station automatic transfer machine was built by the Modern Tool Works, Ltd. It is said to be a Canadian "first."



The Age of Firsts— A Broach

National Broach & Machine Co. has recently manufactured a new broach for a 73 tooth automatic transmission internal helical gear. Said to be the largest of its type, the broach is seven feet long and weighs 700 lb. The broach teeth were ground from the solid by a special machine setup.

For Ex-Cell-O— First in England

Ex-Cell-O Corporation's management reports that its English subsidiary has completed its first machine 30 days ahead of schedule. The first machine is a Style 2112-A precision boring unit. Already, the Eng-

lish management is drawing up plans to expand the plant because of the great acceptance of the machine by England's automobile manufacturers.

H. G. Bixby, president, Ex-Cell-O Corp., reports that the Detroit company has netted a half million dollars more for the first six months of 1955 over 1954.

Transfer— Built in Canada

We recently received a report from Canada's Modern Tool Works telling us about a 12-station transfer machine built for Chrysler of Canada. Needless to say, the Canadian company is quite proud of this "first."

The company's technical director states that the machine performs 5520 operations per hour on die cast torque converter housings. One of the machine's features is that it is highly flexible, according to our informant. The machine performs three main functions—drilling, reaming, and tapping.

More Firsts

Also in this column, there are two other "firsts" shown in the illustrations. One is the largest surface





"World's Biggest" is the claim of Hill Acme for this huge hydraulic reciprocating table type vertical spindle surface grinder, which the firm recently built. It will take workpieces 54 in. wide by 144 in. long. It uses a 42 in. diam wheel.

grinder built by Hill Acme, and the other is a skin mill produced by Simmonds Machine Tool Co.

Newer Carbides— Production Asset

According to Carbology engineers, the use of one of the company's newer grades of carbides for machining turbine wheel hubs has cut per piece time by two minutes. They tell us further that machine downtime has been practically eliminated and that tool life is better. The job is being done at Kelsey-Hayes on Inconel X forgings. In one simultaneous operation the forging is drilled, turned, and faced in a Fay automatic using grade 370 carbide cutting tools. Actual production time has been cut from 5.652 minutes to 3.607 minutes. The lathe runs at 58 rpm with the feed and depth of cut of both turning and facing set at 0.144 in. and 3/16 in. respectively.

Tool Firm Combine Told to Dissolve

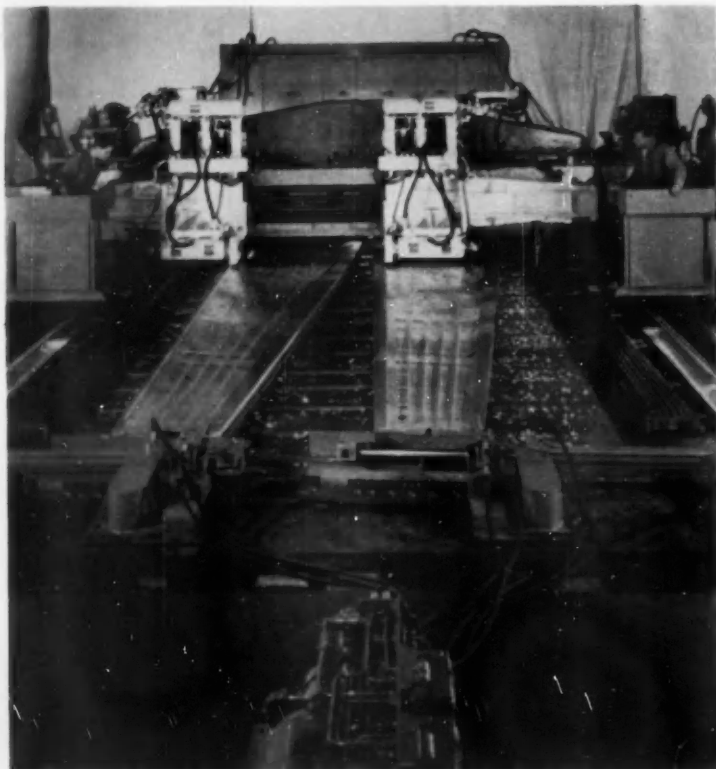
The Justice Department will draw up a formal notice ordering dissolution of an alleged illegal combine of five machine tool companies and associated enterprises doing an annual business of \$90 million. According to a Federal Court in Detroit, an agreement existed among the companies to reserve a field of manufacture exclusively to each company which, the court found, was in violation of the restraint of trade provisions of the Sherman Anti-Trust Act.

The defendants are: Chas. B. De-

Vlieg, Farmington, Mich.; DeVlieg Engineering Co. and DeVlieg Machine Co., both of Ferndale, Mich.; Brown & Sharpe Manufacturing Co., Providence R. I.; Carlton Machine Tool Co.,

Cincinnati; Lodge & Shipley Machine Tool Co., Cincinnati; Mac Investment Co., Cleveland, and Associated Patents, Inc. Cincinnati.

(Turn to page 154, please)



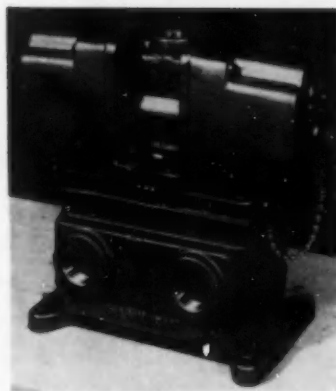
A "first" is claimed by Simmonds Machine Tool Corp. for this 225 ton automated skin mill for Super-Sabre wings. The machine sculpts two integrally stiffened wing panels simultaneously in 3 1/4 hours. Vacuum chucks are used.

NEW**PRODUCTION
and PLANT****EQUIPMENT**

Safety Valve Head

SOLENOID heads for three-way and four-way Pilot-Master valves are electrically inoperative if a maintenance man should remove a solenoid cover and fail to replace it. They feature covers die cast of zinc alloy, splashproof and dust tight. Valves with these new J. I. C. heads are now available in quantity in both designs and in all standard sizes from $\frac{3}{8}$ to $1\frac{1}{4}$ -in. I.P.S. Both single-solenoid and double-solenoid (momentary contact) models are available in both series. The new heads will also be available separately to provide the new features on existing installations. *Hannifin Corp.*

Circle 46 on postcard for more data



Series 88J-4 momentary contact four-way valve with dust tight, splashproof solenoid covers.

Claw Tooth Saw Band

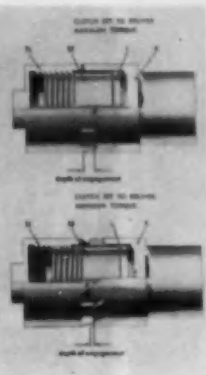
LAATEST in the line of Demon high speed steel saw bands is a claw tooth or positive rake band. It follows the introduction of two zero rake designs a year ago. Tested against a Demon buttress (zero rake skip tooth) using the same feed pressure, the claw tooth was 48 per cent faster at the same feed pressure. At the same rate, feed pressure required was 39 per cent less. It is being offered in four widths from $\frac{1}{4}$ to one in. in four pitches. *DoALL Co.*

Circle 47 on postcard for more data

Screwdriver for Accurate Torque



Typical magnamatic air-powered screwdrivers. Torque setting is achieved by screwing the magnet assembly M into or out of the upper clutch jaw N. This adjustment changes the depth of engagement and hence the angle of contact of the teeth on the upper and lower clutch jaws K. The armature plate L contacts the magnet assembly.



AN UNIQUE "one-shot" clutch is the feature of a portable air-powered screwdriver and nutrunner which provides precise torque control. The clutch disengages fully when the proper torque is attained. It does not chatter with an impacting effect.

Thirteen Magnamatic models are provided, both reversible and non-reversible, for screw sizes from No. 4 to $\frac{1}{2}$ in. A new type of acoustic baffle lowers operating noise. The tool is said to maintain torque at specified

limits even at high speeds.

The magnetic clutch keeps the motor shaft and spindle connected by jaws. When a preset torque is reached, the spindle jaws cam out of engagement with the motor shaft jaws, until beyond the magnetic field. A wedge arrangement prevents the spindle from returning to engage with the shaft, until the tool is removed from the work and until another screw is started. *Chicago Pneumatic Tool Co.*

Circle 49 on postcard for more data

Teflon Packings

CHEMICALLY inert piston cup, U-cup and flange packings are said to provide positive protection against the corrosive action of all types of synthetic non-flammable fluids. They can be used at operating temperatures to 350 F. They are self-regulating to compensate for pressure. Tested and used by major manufacturers of hydraulic cylinders, they are said to be meeting all performance requirements. Piston cup and flange packings are recommended for pressures to 2000 psi. U-cup packings are furnished either to piston or cylinder specifications and are recommended for pressures to 1500 psi. *Crane Packing Co.*

Circle 48 on postcard for more data

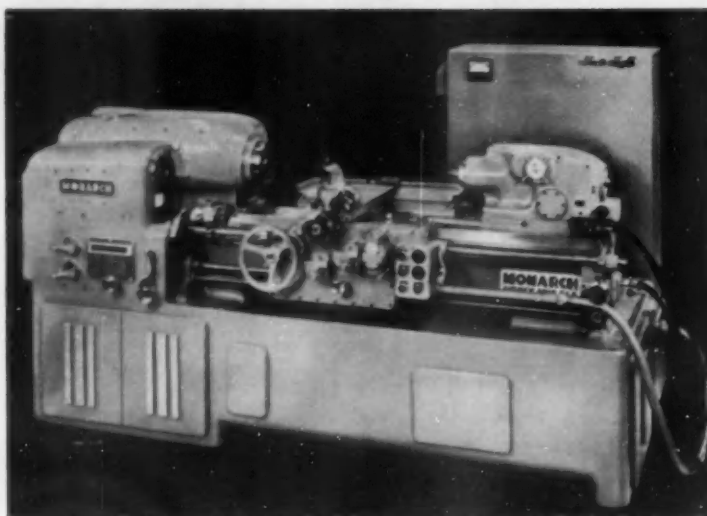
Induction Heating Unit

FOR light heat treating, brazing, soldering, hardening and similar applications, a three-kw high frequency induction heating unit, model I.I-3, has been devised. It uses heavy duty vacuum tubes, air and water cooled. Shielding separates the a-c and d-c sections. Protective devices include fuses, relays, and timing units, and all controls located outside the cabinet. Pilot lights indicate proper air flow, condition of interlocks, overloads and other operating conditions.

The unit features variable auto-transformer stepless control of power output. Thermal output is 170 BTU. *Lindberg Engineering Co.*

Circle 50 on postcard for more data

Lathe for Tooling, Production



Features of the Monarch lathe include the spindle equipped with a dynamic brake which can arrest spindle rotation in two to three seconds from even the highest speed.

SERIES EE, model 1000 precision turning lathe features an all-electric speed control mechanism offering infinitely variable cutting speeds from 25 to 2000 rpm. A single electric control knob provides any desired speed within the particular range selected. Four hydraulically actuated speed ranges are available and shift automatically upon the setting of a range selector switch.

The new machine also is equipped with built-in constant surface cutting speed. An electronic rectifier system, located in a separate electrical control

cabinet, provides power for the machine's 20-hp, d-c variable speed main drive motor. This system reportedly has sufficient capacity to operate the motor at 30 hp without excessive overloading. The "spindle motor load" meter, installed on the front of the control cabinet in full view of the operator, permits the motor load to be constantly supervised.

Motor control and load compensation, also housed in the control cabinet, are handled electronically by means of vacuum tubes and relays. The load compensation control keeps motor

speed constant within five per cent from no load to full load at any particular speed setting. In addition, the full output of the motor may be used at speeds as low as 107 rpm in low range. Below 107 rpm armature control provides constant torque down to 25 rpm.

The apron provides power rapid traverse to both the carriage and the cross slide. Control is by means of longitudinal and cross feed friction levers. Power for the rapid traverse is supplied by an individual motor driven unit equipped with a safety clutch. The safety clutch releases automatically in case of accidental jamming during any traverse movement.

The two speed hydraulic tailstock incorporates hydraulic clamping and unclamping, plus a slight lifting action supplied by spring loaded rollers. Either pushing or pulling the control lever causes automatic unclamping.

Tailstock spindle travel is by means of hydraulic power with finger tip control. There are two hand wheels; one to control a fast traverse movement, the other a slow feed movement.

The headstock offers four infinitely variable, overlapping speed ranges—forward or reverse. The first three ranges are geared ranges, while the fourth range is direct through a multiple V belt drive. The operator resets the range selector switch at the apron. The motor slows down, the gears shift hydraulically and the motor returns to its prior speed. All gearing is idle when the high speed range is engaged. *Monarch Machine Tool Co.*

Circle 51 on postcard for more data

Valve Subplate

A THREADLESS subplate for gasket mounted hydraulic valves eliminates pipe threads in both body of valve or in subplates. The Hupp threadless subplate consists of three elements: inserts, lockplate, and base plate. The bar stock steel insert is the only part in the assembly subject to direct hydraulic pressure. The insert combines in one integral part the sealing face for the O ring, the fluid passage through the subplate and the tube fitting connector body. The lockplate locks the inserts against rotation. It also provides the valve mounting surface flush with the gasket sealing faces on the inserts. Baseplates are made from cast gray iron and act both as the valve mounting pad and the bracket to hold and position the inserts. Subplates may be provided for individual valve mount-

ing or, by using Blanchard ground plate stock with drilled holes in valve port pattern, lockplate and insert groups only will provide an economical multiple valve mounting method. *Peteh Manufacturing Co.*

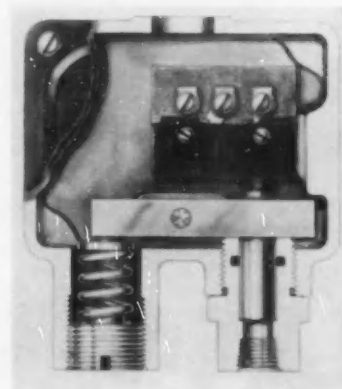
Circle 52 on postcard for more data

Pressure Switch

PISTON type pressure switches for high speed, automatic, heavy duty operation accurately sense any system pressure over an adjustable range of 35 to 12,000 psi. The piston bore and piston are honed and ground. A sealed piston is used to simplify installation and eliminate the need for drain return piping. Extremely high proof pressure is protection against damage from excessive line or surge pressures. It will actuate an electric circuit at any predetermined point on increasing or decreasing pressure. The fixed ac-

tuation value varies from 15 to 1000 psi. *Barksdale Valves.*

Circle 53 on postcard for more data



Barksdale pressure switch.

Hopper Feed

EITHER rolling or sliding parts can be fed with hopper feed No. 2200, automatically at a predetermined rate. Parts are picked up from the hopper by cleats on the moving conveyor and elevated to the delivery point. This unit features a 36-in. loading height and variable delivery point. Hopper capacity is four cu ft. *Feedall, Inc.*

Circle 34 on postcard for more data



Feedall hopper for rolling parts to three in. diam and one in. long, or one in. diam by three in. long cylindrical sliding parts.

Tests Aluminum Coat

A SMALL portable anodized aluminum tester determines the effectiveness with which an anodized coating has been applied to an aluminum surface. Tests previously requiring weeks can now be performed in seconds. The instrument tests chromic- and sulphuric-acid-type coatings, and is designed to meet ASTM-B110 specifications. It operates on the principle that the 60-cycle breakdown voltage is proportional to the coating type and thickness. It is supplied with three ranges. The 0-20 volt range tests the chromic-acid-type coatings, and the 0 to 100 and 0 to 600 volt ranges test the sulphuric-acid-type coatings. A current-limiting feature protects the operator from harmful electric shock. The tester is also useful for measuring other coatings where the voltage breakdown principle can be applied. *Sunshine Scientific Instrument.*

Circle 35 on postcard for more data

Automatic Tapper Is Adjustable



Keller tapper is designed for high-speed production.

THE new Airfeedtapper automatic tapping tool has adjustable torque control, enabling the maximum permissible torque to be delivered to the tap for high output and low breakage. Adjustable feed rates permit the advance to be set for best cutting with a particular tap size, while the return can be set for a slower rate to prevent damage to the entrance thread as the tap is withdrawn.

A micro-depth adjustment permits the tapper to be used for blind-hole tapping. The advance can be held to within one quarter thread, and the tap will automatically back out when

the desired depth is reached. A four-way valve, used to control the tool from any remote station, makes the tapper readily adaptable to automation.

Forward and return poppets are built into the tool. It can be run to a stall and then backed out by pressing the return poppet. This can be repeated until the desired depth is reached, when the Airfeedtapper will automatically back out and shut off. The tapper uses standard Jacobs tapping chucks or Scully-Jones tap drivers. *Keller Tool Div., Gardner-Denver*

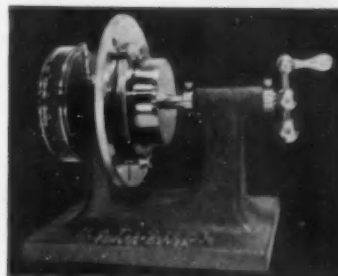
Circle 36 on postcard for more data

Checks Oil Seals

ROTATIONAL torque of oil and grease seals can be measured by a hand operated portable meter now on the market. Said to be a rugged yet precision device ideal for laboratory measurement or factory inspection, it comprises a self-centering, three-

sensitivity instrument for measuring torque to 15 lb-in. in oil seals $\frac{3}{4}$ to six in. in outside diameter. Model 860 is a wide range instrument reading torque to 60 lb-in. on oil seals $2\frac{1}{4}$ to eight in. in outside diameter. *National Motor Bearing Co., Inc.*

Circle 37 on postcard for more data



National oil seal torque meter.

jaw chuck which automatically positions the oil seal under test concentrically with a test shaft. Rotation of the test shaft actuates a calibrated drum to the point where the oil seal torque is exactly matched by resistance from a coiled spring inside the drum. A pointer then indicates the torque directly. Model 615 is a high

Diamond Tester

THE so-called Dyhedron penetration-type instrument for measuring hardness and lubricity of metals, glazed tile, glass, carbon, graphite, precast cement shapes, abrasive wheels and hones and like materials, has been announced. It utilizes a selected octahedral diamond precisely shaped to work itself into the test material with a rotary oscillating motion. The new instrument has an unusually wide application. Its scope of testing ranges from soft plastic to tough steel, both solids and bonded granular materials. The depth of penetration is read from a precision dial indicator and the 360-deg oscillations of the diamond are read from the rotary counter. *Taber Instrument Corp.*

Circle 38 on postcard for more data

Speed Reducer Line Unveiled



Foot-mounted housings shown, and flange-mounted housings and reducers on standard mounting plates are available in the new Line-O-Power speed reducers.

LINE-O-POWER speed reducers with capacities ranging from fractional horsepower to 150 hp employ the maker's "Duti-Rated" gears. Input and output shafts are in a direct line, to permit coupling of motor and speed reducer in less space. Spline Drive

pinion makes it easy for the user to change reduction ratios. The range of nominal ratios for double, triple and quadruple reductions is from 5.06 to 1478. Foote Bros. Gear and Machine Corp.

Circle 59 on postcard for more data

Gage Sorts Gears, Controls Hob

EACH type 80 automatic gear gage and hobbing machine control is custom-designed for particular tolerances established by the user. The unit is capable of handling as many as 1000 gears per hour. Automatic indicators signal when the pitch diameter falls outside allowable limits, also

indicating when the hob has begun to dull. An automatic circuit removes power from the hobbing machine if it produces too many gears outside the tolerance limits.

When used with a suitably equipped hobbing machine, the device automatically controls the machine both

for pitch diameter and for hob shift to compensate for hob wear. Pitch-diameter control is based on modified ball-type measurement of gears as they come from the hobbing machine. When the machine output shows a tendency to depart from mean pitch diameter, the unit signals for pitch-diameter correction. Thus, corrections occur before errors become sufficient to result in scrap gears. It operates with hobbing machines having either electrically or manually operated pitch diameter correction mechanisms.

Hob wear causes a change in the shape of the root-fillet region of the gears. The gage measures the amount of this change and signals for the hob to be shifted when the root fillet build-up reaches a preset limit. It also operates with machines having either an automatic or manual hob shifter.

One unit mounts on a frame or pedestal (not supplied) adjacent to the hobbing machine. Hobbed gears are delivered to this unit either by an automatic chute or conveyor from the hobbing machine or by hand. After checking, each gear leaves the Type 80 through one of three chutes (acceptable, salvageable, or unsalvageable) suitable for feeding conveyors, storage bins, etc. The second unit mounts vertically on a post or panel in any available location. The gage will handle any tooth type gear, in sizes from less than one in. up to several inches diameter, at up to 1000 per hour. Tolerances are adjustable from 0.0005 to 0.010 in. or more from mean dimension, repeatable to better than 0.0001 in., according to the manufacturer. Airborne Instruments Laboratory, Inc.

Circle 60 on postcard for more data



Airborne Type 80 automatic gear classifier is the maker's first entry in the field of machine tool control.

Hose Fittings

RUBBER covered single fiber braid (non-metallic) hose for low pressure service and brass re-usable fittings for this hose have been added to a hose fitting line. The hose, incorporating a high tenacity rayon ply, is used in service with hydraulic fluids, water, crude and fuel oils, hot oil, Diesel fuels, gasoline, and air.

Skiving of this hose is not necessary when assembling with the fittings. Sizes for 1/4, 3/8, 1/2, and 3/4-in. inside diameter hose are offered. Three body types are available: 45 deg flare end, 45 deg flare swivel nut, and male pipe thread. Parker Appliance Co.

Circle 61 on postcard for more data

Industrial Fluid Drive

SELF-CONTAINED fluid drives featuring stepless speed control, no-load starting and excellent torque limiting control now are available.

Designated the type VS class 2 Gyrol Fluid Drive, the new units are available for a wide range of speed adjustment on both variable and constant torque loads. The units are designed for dual rotation. Across-the-line starting is practical in many cases. Torque transmitting capacity is adjusted by positioning the speed control lever. Rate of movement of the same lever governs acceleration rate. The drive is said to be adaptable to manual or fully automatic control.

The drive is available in six sizes from 7½ to 800 hp for operating speeds up to 1800 rpm. The welded steel housing serves as an oil reservoir as well as an enclosure for the rotors, bearings, oil circulating pump and speed regulating scoop tubes. Lubricating oil is provided by a constant-volume turbine type pump.

Input and output shafts are supported by anti-friction bearings with a pilot bearing located between impeller and runner. The impeller and runner (rotors) are enclosed in steel inner and outer rotating casings. *American Blower Corp.*

Circle 62 on postcard for more data

Sliding Head Lathe

A SMALL sliding head automatic lathe, the D-187, mass produces parts up to 3/16 in. in diameter, 2¼ in. long.

Using the same machine base, power units and tooling employed on the ½-in. capacity D-500, extremely high finish reportedly is achieved by spindle speeds up to 15,000 rpm, under pressure lubrication.

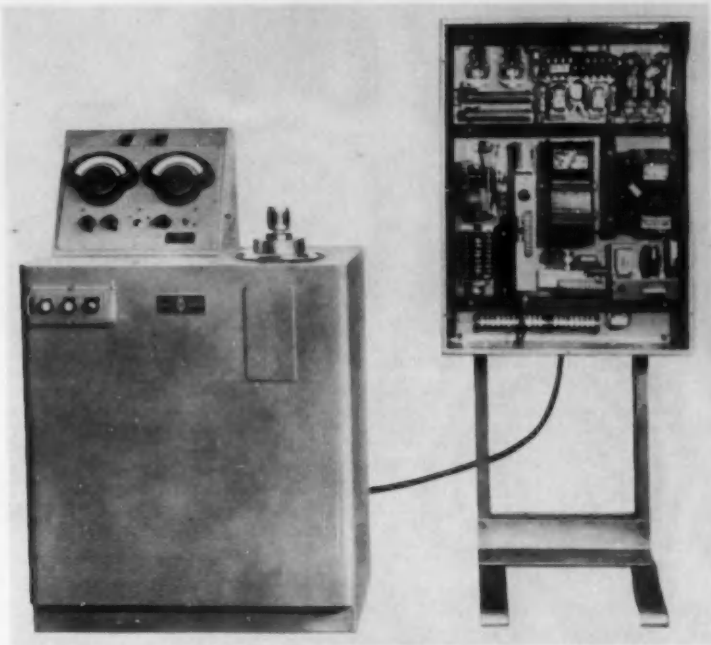
Extreme tolerances are held by an entirely new, highly sensitive sliding head with completely independent pulley carrier bracket. *Howard Automatic Div., Detroit Cam & Tool Co.*

Circle 63 on postcard for more data

Earth Filter

THE Delpark-Olson Superflow filter uses diatomaceous earth with tubular filter elements. Diatomaceous earth reportedly does not affect additives present in most oils and processing fluids. Cleaning is automatic and is accomplished in one to three minutes by back washing. Liquid is forced back through the tubular filter elements from the inside. The earth cake

Balancing Machine Is Easily Read



Minimum operator judgment is required with this balancing machine.

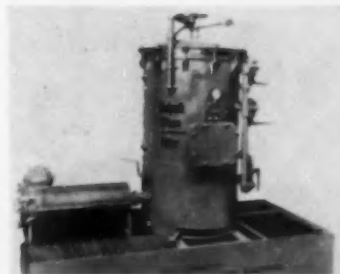
UP to 240 or more parts per hour can be check balanced with a vertical static balancing machine which operates on the "go-no go" principle. The operator merely puts the part on the balancing spindle and starts the machine. If the unbalanced in the part falls within the preselected ounce-inch tolerance, a green light ap-

pears on the control panel. A red light shows if excessive unbalance is present. Signal lights are controlled by a separate unit which can be set for any desired tolerance of unbalance. The machine can also be operated as a standard static balancing machine. *Tinius Olsen Testing Machine Co.*

Circle 65 on postcard for more data

is knocked off and allowed to settle to the cone of the filter. Agitation in the cone prevents packing of the sludge. Capacities range to 175 gpm. *Industrial Filtration Co.*

Circle 64 on postcard for more data



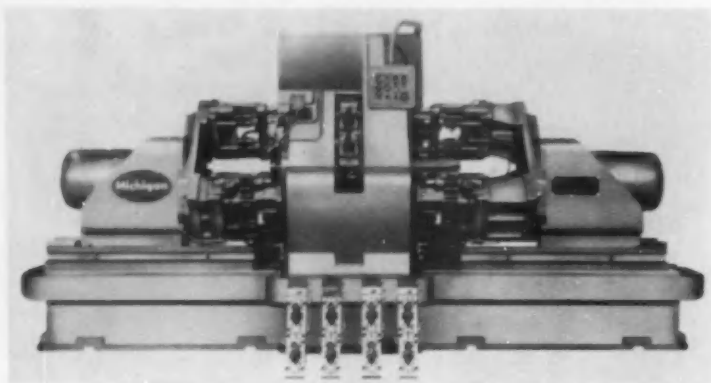
Filter for coolants, cutting oils, teststand oils, hydraulic oils, industrial cleaning solvents and chemicals.

Air Valves

TWENTY-FOUR models of air control valves are made available as four-way valves with ¼, ½ or ¾-in. ports for operation from five to 150 psi. The key models are the double-solenoid type, the air bleed, the air pilot and the hand valve.

The double solenoid valves, available for either eight volts or 110 volts, as well as the air bleed models, are of the momentary contact type. The hand and air pilot valves are offered either for double actuation or spring return. All valves feature two built-in speed controls and all friction surfaces are hardened and permanently coated with a baked-on lubricant. Boxes and connectors are furnished with the solenoid valves and the coils are moulded in epoxy resin. *A. K. Allen Co.*

Circle 66 on postcard for more data



Special Machine Drills Door Hinges

This double end way type hydraulic feed machine drills and reams hinge pin holes in automobile door hinges. The four stations have pot type heads, with axial adjusted spindles. Trunnion type fixtures eject parts automatically. Production is 1800 hinges per hour. (Michigan Drill Head Co.)
Circle 67 on postcard for more data

Valve Speed Control

AN attachment has been designed to add the speed control feature to the Speed King solenoid pilot operated valves. Restriction of flow is accomplished through the main control valve thus eliminating the need of the separate flow control valves. This is done by the addition of adjusting screws in the end caps which will restrict the stroke of the main stem of the valve and thus restrict the flow of cylinder exhaust air through the valve.

Speed control will also be available as a kit to convert those valves already in service to speed control. Valves with built-in speed control and conversion kits are now available for four-way foot mounted and sub-base

mounted, single and double solenoid. Valvair Corp.

Circle 68 on postcard for more data

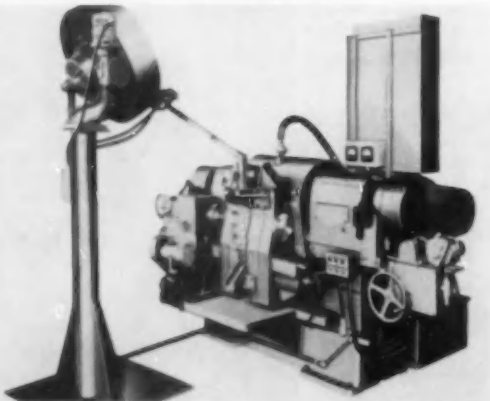
LPG Lift Trucks

FULL Underwriters' Laboratories approval protection on its LPG-powered KG-51 and G-52 series of trucks from 2000 to 10,000 lb is announced by this maker. Previously it had UL approval on KG-51 series of trucks from 3000 to 10,000 lb with ASME and 25 lb ICC LPG containers. The latest approval makes available to industry these trucks powered by propane or butane from 20, 33½ and 43½ lb ICC containers. Yale & Towne Manufacturing Co.

Circle 69 on postcard for more data

Hopper Feed for Disk Grinder

Piston pins from the hopper enter a stocking mechanism, from which they are picked up automatically by a rotating carrier plate and clamped in hardened V's of this automatic disk grinder. The carrier plate revolves between opposed grinding wheels, and 0.010 in. of stock is removed from each end of the pins in one pass. Finish ground pins are sized and unloaded automatically through a chute into tote boxes. Automatic feed compensates for wheel wear. Production is 2100 pieces per hour at 100 per cent efficiency. (Mattison Machine Works)



Circle 70 on postcard for more data

Engine Analyzer

AN electronic instrument for diagnosis of automotive engine ills, developed in the research laboratories of Socony-Vacuum Oil Company, Inc., has been made available for general use. Weighing less than 60 lb, the type 901 cathode ray engine analyzer is connected to an automobile ignition system by two lead wires, and gives simultaneous pictures of the behavior of each cylinder in an operating engine.

It diagnoses such common faults as spark-plug fouling and misfiring, broken plugs that are open or short-circuited, defective wiring and switches, worn distributor cam and shaft bearings, and defective coil or condenser, burned distributor points, pre-ignition faults as well as troubles caused by noise and vibration or combustion knock. The instrument may also be used to check ignition timing and operation of intake and exhaust valves.

In all, picture patterns depicting about 65 different engine ailments have been observed and identified. When a particular engine fault has been detected on the picture screen, portions of the pattern can be blown up for more detailed study. Allen B. Du Mont Laboratories, Inc.

Circle 71 on postcard for more data

Modulus Tester

A MACHINE to measure the dynamic damping and elastic properties of rubber, rubber-like materials, and plastics under conditions of strain, temperature, and frequency has been developed. The machine may be calibrated to read both the dynamic damping and dynamic elastic modulus without calculations. The machine has a variable speed from two to 60 cycles per second, with static pre-strain in two directions. Lord Manufacturing Co.

Circle 72 on postcard for more data

Feed Controls

A GROUP of traverse and feed control panels provide rapid traverse forward, one or two adjustable feed rates, and rapid return. The L series will handle hydraulic fluid at up to 20 gpm, at pressures up to 1000 psi. Either all-electric operation or electric reversing control and cam-operated feed are offered. Designed for sub-plate mounting, the controls include small solenoids with low current drain, and fail-safe circuits. Double A Products Co.

Circle 73 on postcard for more data

Gas Generator

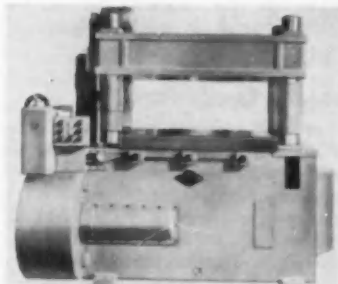
DESIGN of an exo-endothermic gas generator to provide the necessary gas atmosphere for heat treat furnaces has been announced. Called the Exo-Endo, the generator is a compact unit requiring only 20 sq ft of floor space, which is said to be used effectively with all types of furnaces. It can produce gas atmospheres between the limits of perfect combustion and modified AGA type 302 gas. At the latter setting, the gas generated has two main differences from a standard AGA type 302 gas, Dew-points as low as 50 F with no detectable amounts of methane, and approximately 50 per cent lower hydrogen content. This means that for a given carburizing potential, less hydrocarbon addition is required. The lower hydrogen percentage is an added safety feature. *Holcroft and Co.*

Circle 74 on postcard for more data

Compact Press

A 100-ton production press is only seven ft high and measures 75 by 84 in. in area. The pull-down press will operate at 40, 50, 60 or 80 strokes per minute. Features include relatively large bed area and clearance; forced feed lubrication system; herringbone back gear and air clutch. *Alpha Press and Machine, Inc.*

Circle 75 on postcard for more data



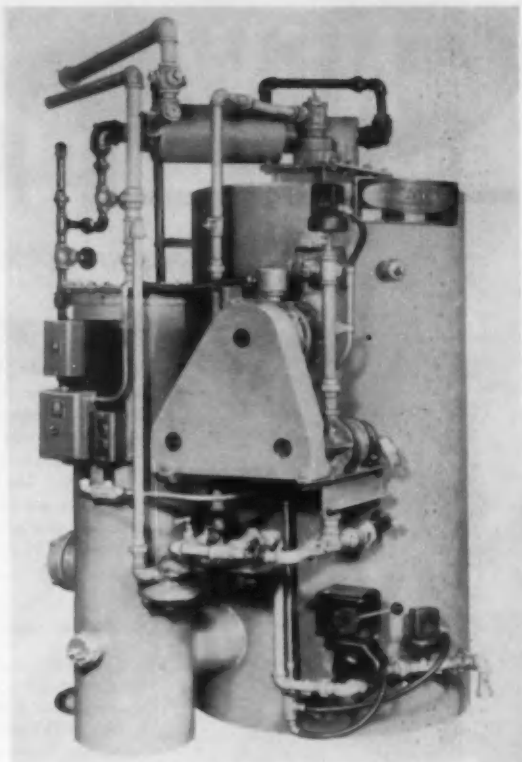
Alpha production press.

Hydraulic Table

A 30,000 lb capacity hydraulic table has been designed to assist in changing big dies. The table has a platform 65 in. wide by 96 in. long and special heavy duty rollers are set in three banks so that dies can be drawn from the long side. A 16-in. range of elevation allows the table to be used with presses having bed heights from 29 3/4 to 45 3/4 in.

In operation, the table is raised by a push button controlled electric pow-

With a slight adjustment the Exo-Endo generator can produce a non-explosive atmosphere for heat treating below the explosive limits required for atmosphere tempering, annealing, and stress relief of ferrous alloys as well as hardening, annealing and tempering of non-ferrous alloys.



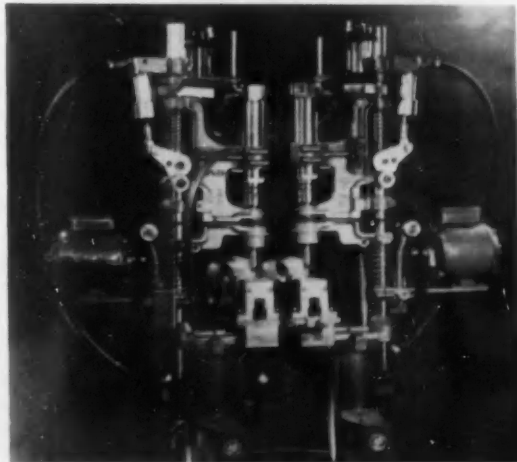
ered hydraulic pumping unit and six synchronized hydraulic rams. After the top is adjusted to the proper bed height the table is bolted to the press by means of special plates welded to the long side for this purpose. Cables

are fastened to the die at two ends and a 96 to 1 ratio double drum winch makes it possible for one man to pull the heaviest dies from a large press. *Raymond Corp.*

Circle 76 on postcard for more data

Dual Riveting Machines

Vertical floor model precision - controlled spin-impact riveters. can be obtained as dual units for the simultaneous heading of two rivets, studs or pins. Center distances are optional to a minimum of 2 1/2 in. Both pneumatic heads are actuated in unison by a precise electronic control. Airflex dual riveters have five capacity sizes for rivets from 1/16 to 1/2 in. in steel or larger in aluminum. Impact frequency ranges from 6000 to 16,000 blows per minute. Air line pressure may be set from 5 to 120 lb. depending on gun size. The machines are suitable for swaging, flaring, reducing and enlarging as well as for conventional riveting. (Lemert Engineering Co.)

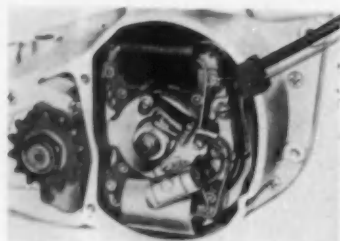


Circle 77 on postcard for more data

NEW

PRODUCTS.

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 93

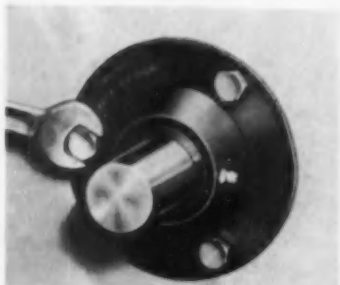


Magneto-Generator for Small Engines

A magneto-generator for use on small engine installations on which lights are required has a circuit that provides energy for the engine ignition and another circuit that supplies power for the lighting equipment. Only one condenser and one set of breaker contacts are used in this magneto. The rotating magnet is mounted on the engine crankshaft.

This magneto-generator is presently being used with good results on the Harley-Davidson "Hummer" motorcycle. On this installation, pictured here, the lighting circuit of the magneto provides power for a seven in. double filament headlight and a three-candlepower tail-light. *Scintilla Div., Bendix Aviation Corp.*

Circle 26 on postcard for more data



Low-Speed Bearing

The Flexi-Range cartridge roller bearing, housed in a flexible neoprene housing, has just been introduced. It is said to be easily installed and lubricated, and to operate almost dust-free. Of steel cage construction, the bearing consists of a roller assembly, outer race, and optional inner race. Roller trunnions extending through holes in the end plates hold the rollers in position. A series of stay rods separate

the end plates, correctly spacing them. The hardened bearing race is inserted into the steel stamping providing clearance of approximately 0.005 in. between the bore of stamping and the OD of the race. This clearance allows a misalignment of one deg between the shaft and the housing. The 1/2-in. size supports a radial load of 415 lb at 100 rpm. *Rollway Bearing Co.*

Circle 27 on postcard for more data



Shock Mount for Vehicle Equipment

A plate-type shock mount for protecting equipment mounted in vehicles against shock and vibration, was engineered to meet rigid military specifications. It can withstand dynamic loads as great as 50g and static loads greater than 100g. The load is carried entirely by knitted stainless steel

wire mesh cushions known as Met-L-Flex. All-metal construction of the mounts and the cushions, overcomes problems of exposure to temperature extremes, oil, grease, water, dirt or solvents, according to the manufacturer. *Robinson Aviation, Inc.*

Circle 28 on postcard for more data



Flange Mounted Bearing

A new line of low cost, flange mounted self aligning bearings, designated F100 Series, designed for machine frame applications such as farm machinery, conveyors, and power transmission. They feature an efficient labyrinth composition seal that assures retention of lubricant and the exclusion of foreign material, and are available in shaft sizes ranging from 1/4 to 1 1/4 in. They are recommended for medium loads and speeds ranging

to 5000 rpm. *Nice Ball Bearing Co.*

Circle 29 on postcard for more data

Name Plate

Newest development of anodized, etched aluminum Metal-Cal pressure-sensitive name plate is a combination matte and shiny surfaced plate. It is available in colors, and is designed for writing, typing, or other marking on the surface of the plate. The matte finish may be marked and erased. *C & H Supply Co.*

Circle 30 on postcard for more data

Free INFORMATION SERVICE

Use either of these postcards for Free Literature listed below, or for more information on New Production Equipment and New Products described in this issue.

USE THIS POSTCARD

FREE LITERATURE

Universal Joint 1

Called the Rzeppa OV, a miniature universal joint is designed for manufacturers of aircraft, ordnance and machine tools, servomechanisms, automotive and farm equipment. It consists of a spherical or cylindrical outer driving member and hardened steel balls rolling in grooved raceways. Each of the six balls transmits torques by free rolling action. Catalog sheet, *The Gear Grinding Machine Co., Joint Div.*

Slip Roll Formers 2

Illustrated 18-page bulletin 77D presents a complete line of power and hand operated slip roll forming machines (Series 6, 4, 3, 2, 1½ and 1 in.). *Niagara Machine & Tool Works.*

Two-Vane Pump 3

Series PFM-100 dual vane hydraulic pumps are designed for high speed direct engine drive, and can be operated continuously at 2000 psi and at maximum speeds from 2000 to 2600 rpm depending upon pump size. Bulletin DP-320. *New York Air Brake Co., Duedo Div.*

Steels Data 4

Two new folders on high strength steels give data, including chemical composition, mechanical properties, fabricating practice for cold forming, rolling limits and applications, on "50," "65," and "70" high strength steel. Forms ADV-667 and 668. *Republic Steel Corp.*

Amplifiers 5

Multichannel amplifier system D for use when recording data on oscillographs is illustrated and using and specifications are given in bulletin 1403D. *Consolidated Engineering Corp.*

JIC Standards 6

Revised pneumatic standards of the Joint Industry Conference for industrial equipment have been compiled in a 12-page illustrated booklet, offered by *Miller Fluid Power Co.*

Automatic Sizing 7

A bulletin describing an electronic gage for automatic sizing of workpieces in the machine is available from *Electro - Autosizing Machine Div., Industrial Gauges Corp.*

Roll Welding 8

Machines for resistance welding by the roll forming method are illustrated in folder No. 554 now being distributed by *Taylor-Winfield Corp.*

Carbide Tools 9

New information on increasing carbide tool life and reducing tool costs is available in the eighth edition of the *Carbide Methods Manual*. It includes information on applications of the company's new steel cutting grades CA-608 and CA-610. *Allegheny Ludlum Steel Corp.*

(Please turn page)

7/15/55

VOID After September 15, 1955

Circle code numbers below for Free Literature, New Plant Equipment or New Product Information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

TITLE

NAME (Please Print)

COMPANY OR BUSINESS

ADDRESS

(No. & STREET)

(CITY)

(ZONE)

(STATE)

FIRST CLASS

Permit No. 36
(Sec. 34.9 P.L. & R.)
New York, N. Y.

BUSINESS REPLY CARD

No Postage Stamp Necessary if Mailed in the United States

POSTAGE WILL BE PAID BY

AUTOMOTIVE INDUSTRIES

P. O. Box 66,
Village Station,
New York 14, N. Y.

Readers Service Dept.

Drill Units

10

The second in the ASTE Data Package Series covers the specifications and performance features of drill units. Twenty-four pages are devoted to engineering drawings, photographs, tabulated specifications, and written detailed descriptions of the many varieties of drill units and components available to users in the metalworking field. Automatic and manual-operated drill units are treated. Both permanent and portable models are described along with mounting specifications and accessories for each. Included also in the catalog-type data sheets are air and electric-powered drilling assemblies that have both hydraulic and pneumatic feeds. *American Society of Tool Engineers.*

Controls

11

A broad line of automatic industrial controls for temperature, level, pressure, and flow is covered in a catalog just off the press. *General Controls Co.*

Finishing Holes

12

Carbide hole finishing burs, their advantages and stock sizes are described in four-page Circular 584. *Pratt & Whitney Div., Niles-Bement-Pond Co.*

Spray Masks

13

Several types of masks for spray decorating plastics, die-castings and metal stampings are shown in typical applications including automotive trim in a 20-page brochure. *Wm. M. Fiore, Inc.*

Small Presses

14

Bulletin No. 1036-B gives complete description and specifications on Hydrolairs, small hydraulic production presses powered solely by compressed air. Text includes full dimensional and operational data, tonnage capacities, and specifications on electric and steam-heated hot plates. Among uses listed are plastics and rubber molding, assembly forcing, laminating, and compacting. *Elmes Engineering Div., American Steel Foundries.*

Speed Switches

15

A complete line of speed sensitive switches is described and illustrated with mounting dimensions in bulletin No. 504S. *Synchro-Start Products, Inc.*

Controls

16

Typical installations of special electrical controls in various industries are shown in a short picture booklet. *W. F. & John Barnes Co.*

Cold Forming

17

Information on how to solve fastening problems is available in a series of data sheets titled "Cold-Forming Design Data" produced by *Townsend Co.*

Investment Castings

18

An 11 by 17-in. chart of standard investment casting alloys is designed to act as a ready reference guide for all engineers concerned with the selection or specification of investment castings. It covers stainless, low alloy and tool steels, nickel alloys, copper base alloys and aluminum alloys. For each alloy, the chart lists a complete chemical analysis and mechanical properties (heat-treated, annealed and as-cast). In addition, the chart rates the alloys as to castability, machinability, corrosion resistance, weldability, response to plating, response to heat treating and magnetic properties. A "rule of thumb" listing on alloy applications is also included. *Precision Metalmaths, Inc.*

Replacing Machines

A slide rule type calculator has been devised in applying MAPI formula for adverse minimum determination. Write for one on company letterhead to *Sundstrand Machine Tool Co., Rockford, Ill.*

Light Coating

A guide to the design and specification of aluminum and magnesium sand, permanent mold, and die castings was announced recently. A limited number are available on letterhead request to *Rolle Manufacturing Co., Third and Cannon Ave., Lansdale, Pa.*

AUTOMOTIVE INDUSTRIES

P. O. Box 66,

Village Station,

New York 14, N. Y.

POSTAGE WILL BE PAID BY

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

FIRST CLASS
Permit No. 36
(Sec. 34.9 P.L. 88.1)
New York, N. Y.

Circle code numbers below for Free Literature, New Plant Equipment or New Product Information

VOID After September 15, 1955 7/15/55

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

NAME (Please Print) TITLE

COMPANY OR BUSINESS

ADDRESS

(No. & Street)

(City)

(Zone)

(State)

USE THIS POSTCARD

HY-PRO SPECIALIZES TAP DESIGN



DESIGNS are made to suit your specific demands by Hy-Pro engineers, who specialize in taps.



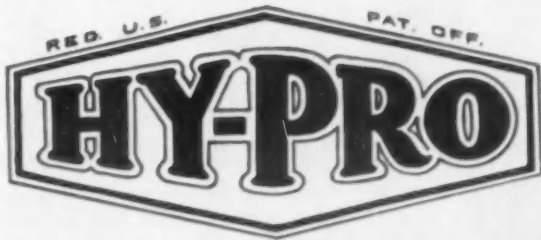
INDIVIDUAL BLUEPRINTS accompany every order followed in Hy-Pro's production line. The quality of your Hy-Pro taps is insured by this one of many specialized procedures.

...to save costs in your production

Tap design is specialized at Hy-Pro. In fact, their whole operation is concentrated on the development and production of this one important line. Toward this end, Hy-Pro's design engineers are able to center their attention on the most efficient and economical taps for the jobs you need.

Over 5000 blueprints are handled every week . . . another indication of Hy-Pro's recognition in this field as "*The Tap Specialists*".

Whatever your own tap needs may be, let Hy-Pro help you boost production. Contact your local distributor or call Hy-Pro direct. They offer you a full line of quality taps, plus the experience of specialized design engineers.



HY-PRO TOOL CO., NEW BEDFORD, MASS., U. S. A.

DISTRIBUTORS IN ALL LEADING CITIES

ADDITIONAL WAREHOUSES: 6046 College Ave.
OAKLAND 18, CALIF. Piedmont 5-4337

10428 W. McNichols Rd.
DETROIT 21, MICH. University 4-1077

11232 Lawler St. (Worth)
CHICAGO, ILL. Garden 4-0217

109 Edison Pl.
NEWARK 5, N. J. Market 2-4318

NEW

AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 93

Axial Blowers

Axial flow blowers to provide highly efficient air delivery or exhaust has been announced. The blowers were developed and engineered by Plannair, Ltd., of England and have

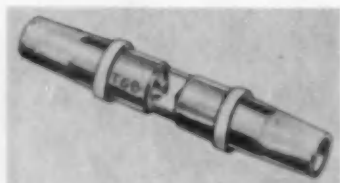


found wide acceptance for airborne, seaborne and ground duty. The blowers are now being produced in standard sizes at rated capacities from 16 to 750 cfm. They are self-contained units incorporating a rotor coupled to an electric motor, either d-c or a-c. These are but three of the standard sized blowers being manufactured. Center blower is designed for clip mounting while the other two are designed for flange mounting. Regardless of their attitude when mounted, blowers perform at rated efficiency. *Pesco Products Div., Borg-Warner Corp.*

Circle 36 on postcard for more data

Cable Splice

Recent Armed Services approval of aircraft electrical cable splices has brought about introduction of a special connector line. Its new, self-



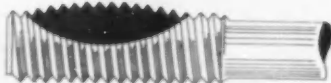
insulated aircraft splices join cables in sizes ranging from No. 22 to No. 10 AWG.

Inside the metal barrel, at its center, is a built-in stop which prevents the conductors from pushing out the opposite end. The splice is staked to each wire at two points simultaneously, on the bare conductor and on the wire insulation just behind it. A center barrel inspection hole permits a quick check of the conductors for proper positioning after staking. *Thomas & Betts Co.*

Circle 37 on postcard for more data

Turnbuckle

Self-Locking male threads in the form of self-locking aircraft turnbuckles and special bolts and screws



are now being manufactured. The screw thread reportedly eliminates the need for safety wiring, cotter pins, lockwashers, lock nuts, jam fits, staked bolts, etc. A wide range of adjustment is permitted with positive locking torque. The threads remain distortion-free and can be reportedly removed and replaced with adequate locking torque and absence of galling of threads.

Locking action is achieved by a convex fiber insert in the thread of the bolt. It is said to be easily inserted, and to insure locking action along the entire length of insert against the nut or female thread. *Starloc, Inc.*

Circle 38 on postcard for more data

Small Relay

A hermetically sealed micro-miniature relay is believed to be the smallest of its rating ever developed.

The relay is less than an inch in

height and weighs only 10 grams. Contact rating is two amp resistive load at 30 v dc or 115 v ac. A balanced armature design is reported to give high resistance to shock and vibration.

Rated for operation at 1.5 milliseconds, the sealed relay has contact



springs of beryllium copper, designed to hold their adjustment indefinitely during temperature cycling and storage. *Specialty Control Dept., General Electric Co.*

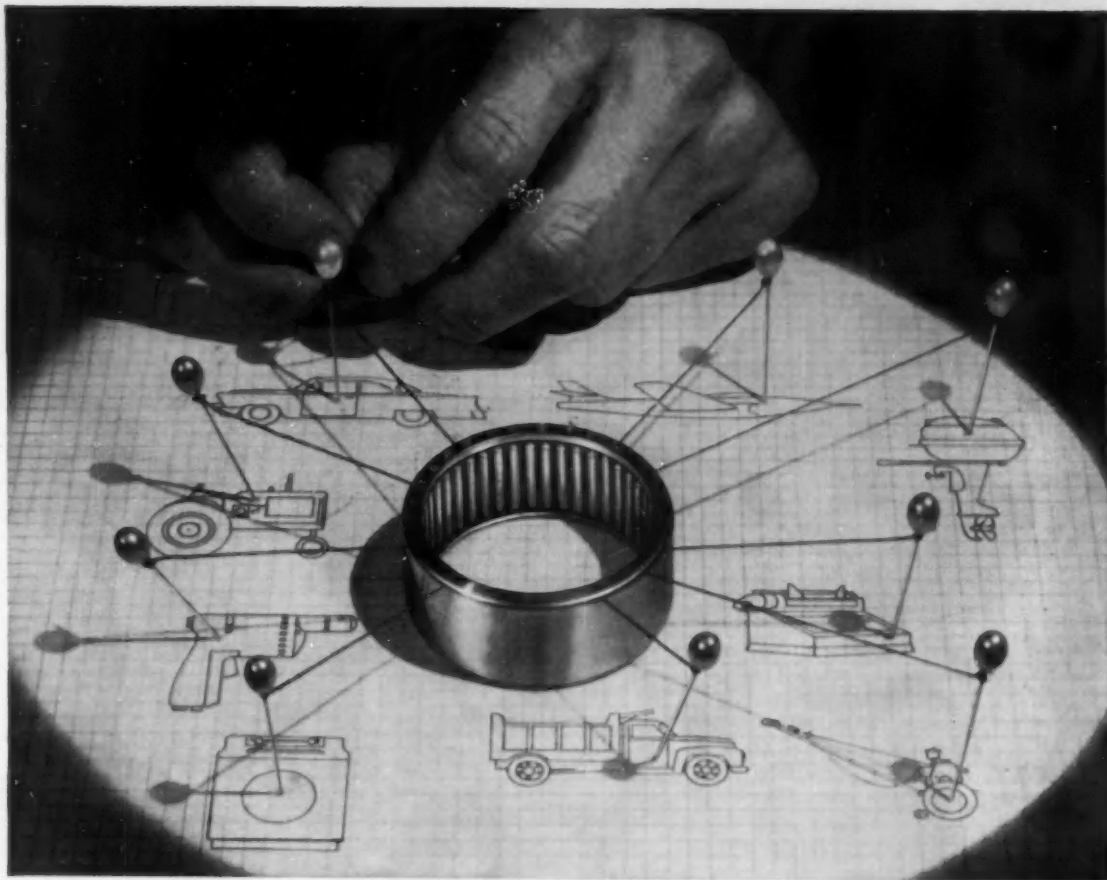
Circle 39 on postcard for more data

De-icing

High strength porous stainless steel sheet has been designed to accomplish anti-icing and de-icing of aircraft using hot air. Compressor bleed air at temperatures of 400 to 700 F is ducted directly to the plenum chamber which extends the full length of the wing leading edge; the leading edge of the wing being fabricated of the porous metal. Heat transfer is reported to be virtually 100 per cent.

The porous metal itself is reported to retain its strength at temperatures in excess of 600 F. It can be formed, machined, and riveted in much the same way as high strength aluminum materials. Construction of a leading edge in porous stainless steel is only slightly different from standard construction using aluminum skin, and very much simplified compared with an aluminum double skin such as is used for hot air anti-icing. Substantial weight savings also are said to result. *Aircraft Porous Media, Inc.*

Circle 40 on postcard for more data



*"The **TORRINGTON Needle Bearing** is Versatile"*

It can whip friction in one of our newest jet fighters at terrific altitudes and speeds. It can pitch in and help a Kansas farmer cut his wheat. Or it can help your wife park the family car in a tight spot without a struggle.

Wherever the Torrington Needle Bearing is put to work, its unique combination of high radial load capacity and small size enables designers and manufacturers to make their products stronger, lighter and more compact. That's why this versatile bearing has become "standard equipment" in thousands of products throughout industry.

In the twenty years that the Needle Bearing has been made, Torrington's Engineering Department has accumulated many lifetimes of experience in adapting the bearing's advantages to products as diverse in size and use as adding machines and tractors. We are always glad to make this experience available to you. *It can be obtained nowhere else.*

See our new Needle Bearing Catalog in the 1955 Sweet's Product Design File — or write direct for a catalog.

THE TORRINGTON COMPANY
Torrington, Conn. • South Bend 21, Ind.

District Offices and Distributors in Principal Cities of United States and Canada

TORRINGTON NEEDLE BEARINGS

Needle • Spherical Roller • Tapered Roller • Cylindrical Roller • Ball • Needle Rollers

*These features make the **TORRINGTON** NEEDLE BEARING unique*

- low coefficient of starting and running friction
- full complement of rollers
- unequalled radial load capacity
- low unit cost
- long service life
- compactness and light weight
- runs directly on hardened shafts
- permits larger and stiffer shafts



For assembly, the Ford chassis is raised off the floor and leveled before the two main sub-assemblies—the cab and body shell—are mounted in place. All operations for assembly are carried out at this station

LATEST PLASTIC TRUCK BODY DESIGN

Permits Easier Fabrication

SINCE the prototype United Parcel Service plastic door-to-door delivery truck was built and put in service, there have been several design changes in the body, primarily from the standpoint of facilitating the production of the polyester plastic unit. Lunn Laminates, Inc., which made the original model (see *AUTOMOTIVE INDUSTRIES*, June 15, 1954), is currently set up with a complete vacuum bag molding line scaled for the production of one truck per day. All production parts are assembled to a slightly modified Ford truck chassis.

One of the major design changes was splitting the roof and side panel in two parts, instead of the orig-

inal one-piece molding, for ease of manufacture by the vacuum bag method. Two other changes consist of a four-bar removable grille held in place by two thumb screws and a redesigned aluminum bulkhead. Metal parts for the novel vehicle are sub-contracted by Lunn. The water filler cap cover is now held in place by a small permanent magnet.

For the production model, most of the polyester glass fiber truck parts are made with three layers of
(Turn to page 119, please)



Left—All 22 of the UPS delivery truck components shown here are bag molded by Lunn. The front end molding was not yet sanded when the illustration was made, therefore, it is grayish in appearance. Right—Mold for the translucent curved roof of the delivery truck is shown being given a complete waxing. This procedure is carried out on all molds before initial layup of the gelcoat, glass, and resin.

The Country's Best
IN OIL AND GAS ENGINES
carry these
SCHWITZER-CUMMINS PRODUCTS



Positive displacement
superchargers



Exhaust driven
turbochargers

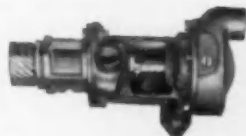


Automatic
shaft
seals



Crankshaft
vibration dampers

Fans for all
industries

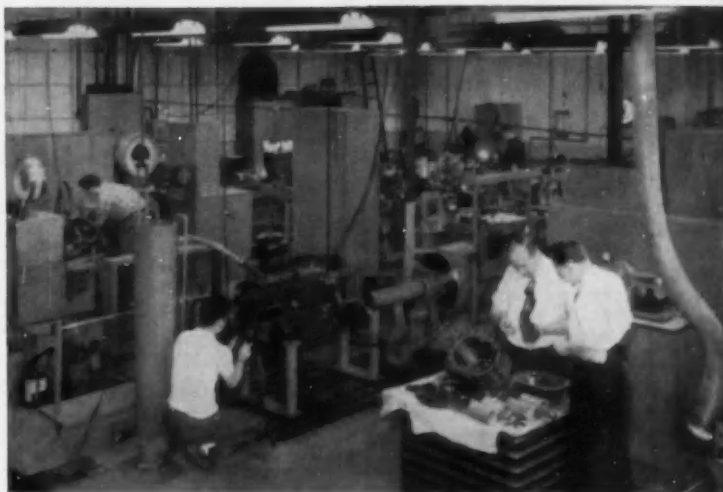


Engine cooling water pumps



Automotive oil pumps

For over a third of a century we have been major suppliers to all branches of the broad automotive industry. Our products have contributed much to the success of hundreds of blue ribbon internal combustion engines—large and small, mobile and stationary, land and marine, for all fuels, and for aircraft. We have acquired a wealth of engineering and field experience and ability to apply it to our customers' needs and manufacture our products economically. This experience and ability is available to you. Why not give us the opportunity to work with you on your new products or to improve current models?



Just a section of our complete and extensive facilities for developing and proving our product, for rubber research, dynamometer testing of engines, physical and chemical analysis and testing of materials.



Air Starting Motors and
Thermostatically Controlled
Fan Drives manufactured
for and sold exclusively by
the Bendix-Westinghouse Automative
Air Brake Company, Elyria, Ohio.



SCHWITZER-CUMMINS COMPANY

1125 MASSACHUSETTS AVE. • INDIANAPOLIS 7, INDIANA

The BUSINESS PULSE

Business in General Expected to Remain Good During Second Half of Year. Unemployment Down to 2.5 Million, the Lowest Level Since December, 1953. There Is Room for Expansion in Smaller Industries.

This Survey Is Prepared
Exclusively for AUTOMOTIVE
INDUSTRIES by the Guaranty
Trust Company of New York.

Favorable Trends

Unexpectedly favorable current business trends, together with the somewhat more conciliatory atmosphere on the world scene in recent weeks, have begun to color the judgments of businessmen respecting the outlook. There appears to be growing confidence that general business will suffer no serious let-down in the second half of the year. Indeed, a great many commentators are going on record with predictions that no trouble is in sight even through 1956. This optimism shows up dramatically in the New York Stock Exchange, where quotations are scaling new highs and where the outstanding number of shares sold short fell at mid-June to the lowest level in nearly a year and a half.

The May figure for the Federal Reserve index of industrial production came as a surprise to many analysts when it was released. On a seasonally adjusted basis, it was higher than the April level by two full points, a rise which matched the monthly strides taken in the earlier phases of the business recovery. During May, before the index number was computed, there were signs of an abatement of the upswing in business which made it seem questionable that the index would show a rise for the month of more than one point. Specifically, it appeared that expansion in the "big three"—steel, automobiles, and construction—was slowing, as compared with the rapid acceleration of the winter months. Actually, when seasonal factors are taken into account these major industries performed about as expected, that is, steel and construction registered gains which were less vigorous than those of earlier months, while automobile production edged off slightly. But the performance of these "eyecatchers" was overshadowed by advances in the wide range of other industries. Among durables, for example, increases were recorded in the output of such things as fabricated metal products, machinery, transportation equipment other than auto-

mobiles, and furniture. In the nondurables category, advances were scored in textiles and apparel, paper and printing, and chemicals. Among minerals, coal output moved ahead very briskly. What all this adds up to is that by May the diffusion of the boom had proceeded so far that gains in over-all output were no longer primarily dependent on the original stimuli.

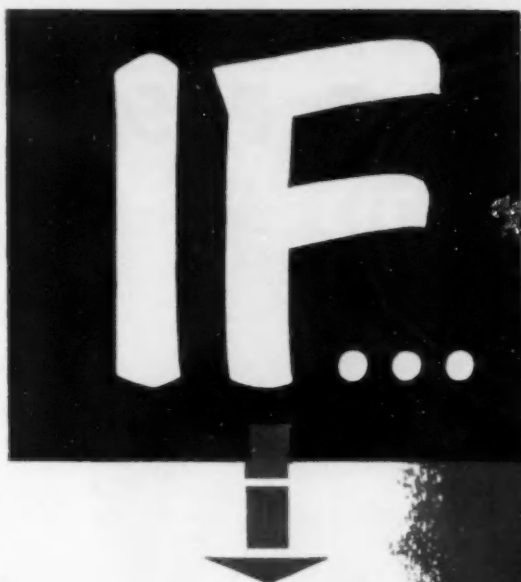
Federal Reserve Index At All-Time High

The diversified advance of productive activity in May carried the Federal Reserve's seasonally adjusted index to 138 per cent of its 1947-49 average. This was significant because it represented a new all-time high, topping the previous record of mid-1953 by one point. But although over-all industrial production is now back at its previous peak, there are significant differences in its make-up as compared with mid-1953. Probably the outstanding difference is that production for military purposes is now of greatly diminished importance. In addition, there has been a continuation of the long-term secular shift to "newer" products and a shift also in the field of consumer goods in the direction of greater proportional outlay on durables as against nondurables.

No Appreciable Inventory Buildup

At 138 per cent of its base-period average, industrial production in May was more than 12 per cent above last year's recessionary low. Since this is a gain of very substantial order, there is ground for satisfaction in the fact that there has been as yet no appreciable inventory buildup. As a matter of fact, inventory liquidation continued through the final quarter of 1954, although by that time the rate of decline was slight. Moderate accumulation got under way in the first quarter of this year, and it appears to have gathered momentum of late. Yet the evidence indicates that the net addition to business stocks thus far has been relatively small, and many businessmen, particularly manufacturers, seem to regard current inventory coverage as thin. In April—the latest month for which official data are available—the ratio of inventories to monthly sales for all manufacturers was 1.66. By contrast, this ratio had been moving in

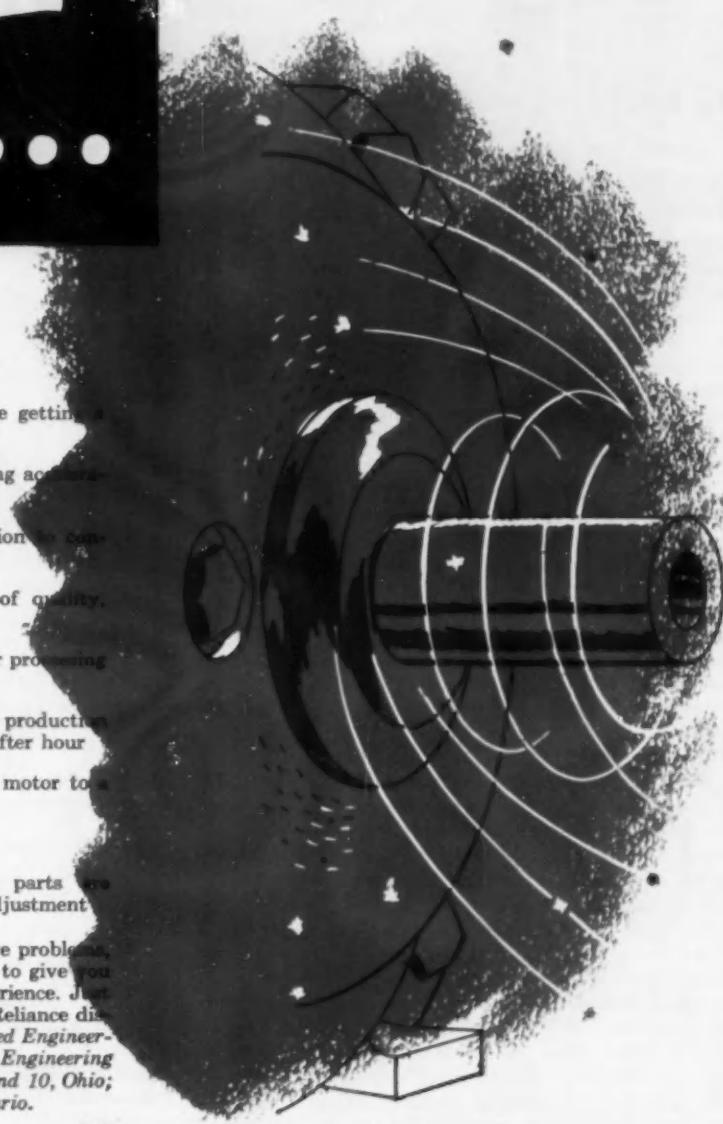
(Turn to page 198, please)



- You are spending too much time getting a tool to and from an operation
- You are having trouble controlling acceleration under tension
- You need a more precise operation to control scrap
- You need hair trigger control of quality, quantity and size
- You want to start and stop your processing line faster
- You would like to leave your production line virtually unattended hour after hour
- You require re-acceleration of a motor to a previous exact speed
- You want centralized control
- Your mechanical transmission parts are wearing out or getting out of adjustment

Or if you have other motor-drive problems, our sales engineers are prepared to give you the benefit of our 50 years' experience. Just get in touch with your nearest Reliance district sales office, or write to *Applied Engineering Division, Reliance Electric & Engineering Co., 1123 Ivanhoe Road, Cleveland 10, Ohio; Canadian Division, Welland, Ontario.*

L-106



RELIANCE **ELECTRIC AND
ENGINEERING CO.**

Builders of the Tools of Automation

AIR BRIEFS



By RALPH H. McCLARREN

Aviation Facts and Figures

In the preface of the 1955 issue of *Aviation Facts and Figures*, just off the press, official publication of the Aircraft Industries Association, Admiral D. C. Ramsey, USN (Ret.), president of the association, says in part, "The United States Aircraft Industry has become what future historians will perhaps consider the most dominant force in the shaping of the nation's economy and security. It has given, and will continue to contribute, in large measures to the freedom and well being of the world."

Here are some of the highlights from *Aviation Facts and Figures: United States* aircraft industry in 1954 was the largest manufacturing employer of all industry in the Nation; some 800,000 men and women are engaged in producing aircraft; military purchase of aeronautical products accounted for between 85 per cent and 90 per cent of the industry's annual volume; the peak production of aircraft occurred in 1944 with approximately 96,300 aircraft. Production for 1954 was estimated at approximately 13,000 aircraft—9600 of these military and 3400 civilian aircraft.

In 1954, 805,700 men and women were employed in the aircraft industry. The greatest number employed occurred in 1943, when 1,342,500 were employed. The average weekly earnings in 1954 were \$85.02. These earnings are $5\frac{1}{2}$ times what they used to be 40 years ago.

The earnings of the aircraft industry during 1954, upon a rate of profit to sales relations for the industry was 3.8 per cent. Net worth of the industry in 1954 was \$641 million compared to \$380 million in 1950. Sales volume for 1954 grossed almost \$5 billion. Profits, after taxes, increased from 0 to 1948 to approximately \$180 million in 1954.

To meet military aviation requirements it is stated that during 1956 the initial equipping of the 137-wing Air Force will be practically completed and thereafter production will level off at a rate needed to sustain and keep modern this force and its naval air equivalent.

Guided missiles occupy an increasing position in the procurement of aircraft. In 1954 guided missile procurement by the Defense Department amounted to \$503 million. This is up from the \$21 million in 1951; \$170 million in 1952, and \$295 million in 1953.

There are many other interesting and illuminating figures relating to airlines and transportation, civil aviation (figures on these have appeared in past issues of *Airbriefs*), helicopters, aircraft exports, flight training, and research and development. For research and development—total federal expenditures have decreased during the past two years—\$67,772 million in 1954 compared to \$74,274 million in 1953. Peak expenditures for research and development occurred in 1945—\$98,703 million. In 1940 only \$9,183 million of federal monies were expended for research and development work.

Flight Safety Award

An annual award has been established by the Kansas Women's Aeronautical Association to be presented to that person in industry who has most effectively
(Turn to page 140, please)

UNFILLED ORDERS vs SALES in the Aircraft Industry

Company	Thousands of Dollars		Fiscal 1954 Sales
	April 1, 1954	April 1, 1955	
Beech	\$76,454	\$74,331	\$78,033
Bell	450,232	296,191	185,646
Boeing	12,357,000	12,131,000	1,033,176
Chance Vought	310,000	193,000	149,627
Curtiss-Wright	825,000	860,000	475,084
Douglas	2,023,000	1,892,000	915,217
Fairchild Engine	285,000	200,000	140,428
Garrett	95,000	100,000	101,158
General Dynamics	2917,000	1,035,000	648,641
Grumman	509,000	553,028	235,318
Lockheed	1,289,443	1,085,000	732,872
McDonnell	497,534	319,692	123,092
Martin	1550,000	1600,000	270,729
North American	1,106,788	1,066,243	645,821
Northrup	2411,000	2366,000	171,396
Republic	979,000	1950,000	323,457
Solar	261,578	250,422	65,062
United	1,075,000	1,300,000	654,997
¹ Jan. 1.	² June 30, 1954.		³ Jan. 31.

Source: Standard & Poor's Industrial Surveys



ONLY 5 SECONDS!

TO RESTORE POWER
with **SYNCHRO-START**
Automatic **CONTROLS**

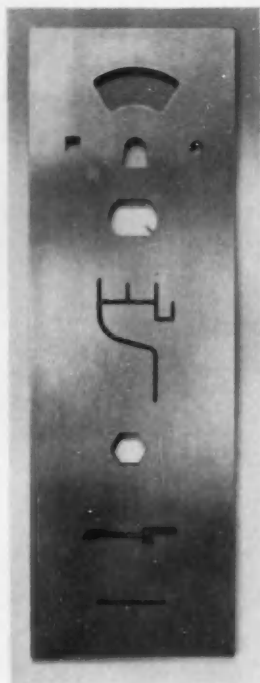
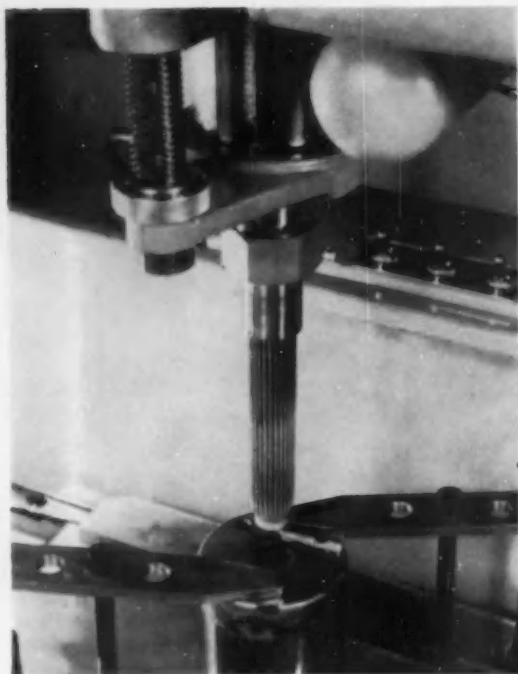
Power failure can be a costly inconvenience in dollars, and even lives. The instant the main power fails, a SYNCHRO-START equipped standby generator set will go to work and get the generator on the line to provide emergency power. With most small engines, the plant will be on the line producing emergency power in five seconds or less—larger engines in proportion.

The proper SYNCHRO-START automatic controls can be furnished for any model of internal combustion engine. In addition to power failure starting, they are used for fire protection, water and sewerage pumping, underpass pumping, mine ventilation, industrial processing, refrigeration, television, telephone, radio, etc.

Write for full information or contact your engine dealer or manufacturer.

SYNCHRO-START PRODUCTS, INC.
Automatic Engine Control Equipment
8181 N. RIDGEWAY AVE. • SKOKIE, ILLINOIS





At far left is an example of a hardened tool steel block in which a finely serrated hole has been produced in an Elox machine. The tool or electrode that did the job may be seen directly above the work piece. It is made of brass and is hollow. As the tool progressed through the block the core remained within the center of the tool and finally dropped out.

At immediate left is a sample piece of metal to show some of the variety of formations and surface embossments that may be produced.

Below is a special aluminum part in which the grid pattern and accurately spaced holes were produced in a single setting, using a suitable brass tool.

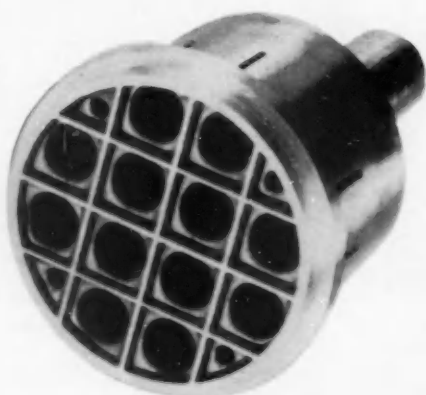
ELECTRONIC DISINTEGRATORS *Have Wide Variety of Uses*

STARTING with modest objectives back in 1943 when the Elox Corp., of Michigan, now located in Clawson, Mich., introduced the first electronic disintegrator device for salvaging expensive aircraft engine sections that contained broken taps or drills, the company recently has made enormous strides in exploiting a new technique of major importance to the automotive industries.

Termed the Elox electrical discharge machining process, it is being applied in a variety of ways for the machining of otherwise hard-to-cut alloys, for the machining of cemented-carbide dies and single-point carbide cutting tools, for an endless variety of die-sinking and die salvaging applications, for machining and trepanning aircraft alloy materials in product applications.

All of these operations are performed by means of electrical discharge technique, without resorting to metal cutting or conventional grinding, using simple or formed brass wheels or other forms made of brass.

Consider a few typical examples: Single-point carbide lathe tools can be shaped to size and form without grinding, using a brass wheel in a tool grinder setup. Since the wheel does not contact the work, it neither wears nor requires dressing. One prominent automotive producer, testing the technique on grinding of tools for a crankshaft lathe, reports an increase of 100 per cent



in the number of pieces per grind, $\frac{1}{4}$ less stock of tools required in reserve, and a saving of 300 per cent in monthly tool cost.

It may be noted at this point that the Elox process is of electronic character in which the workpiece is bombarded by a series of controlled electrical discharges occurring at the rate of 20,000 to millions per second between the tool or electrode and the work. In actual operation in a specific Elox machine, the work is held immersed in a tank of suitable high-dielectric coolant and the electrode is
(Turn to page 124, please)

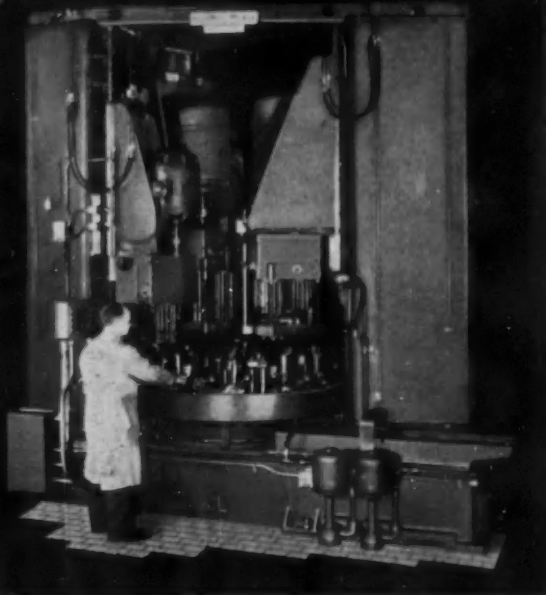
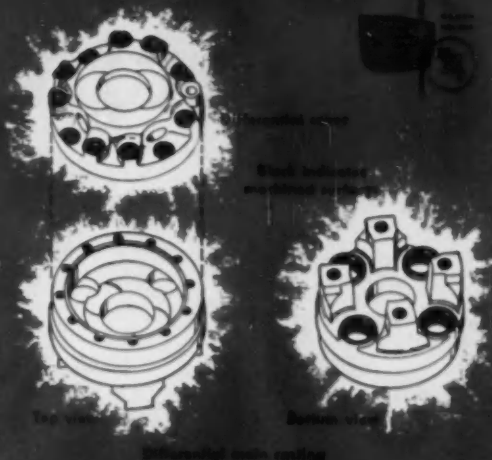
CUSTOMER SPECIFIED

Customer specified a multi-purpose production machine to perform 12 operations in sequence on both the main casting as well as the cover of a differential housing.

KEARNEY & TRECKER DESIGNED

Kearney & Trecker designed this new 88-spindle drilling and tapping machine to complete 134 pieces per hour, 67 covers and 67 main castings.

Machine features rugged columns which provide rigid support . . . and exacting accuracy. Five fixtures, each holding three workpieces, are mounted on a standard Kearney & Trecker 60" rotary index table. Machine employs three vertical drilling heads, each counterweighted. First head has 48 spindles and performs drilling, counterboring, flat bottom drilling and chamfering. Second head carries 28 spindles and handles spotfacing, reaming, boring and trepanning operations while head No. 3 with 12 spindles does tapping operations.



New production efficiency starts with Kearney & Trecker Milwaukee machine tools

This new machine proves that you can rely on Kearney & Trecker's Special Machinery Division to give you the highest production possible at lowest cost. Because with more than 50 years' experience in machine design and manufacture, Kearney & Trecker Corp. has all the ingenuity and skill required to solve high pro-

duction machining problems.

Why don't you take advantage of our abilities? They can pay off in profits for you. Your Kearney & Trecker Special Machinery Division representative will be pleased to give you all the details. Contact him today!

For more details on the machine illustrated ask for Data Sheet No. 1052. Also, free booklet "Doorway to a proven method for solution of big and small metalworking problems" is yours for the asking.



Special Machinery Division

MILWAUKEE 11, WISCONSIN, U.S.A.

Builders of Precision and Production Machine Tools Since 1898

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Continued from Page 43

Ford Launches \$100,000 Atomic Study Program

Research on the peacetime applications of atomic energy got another boost with the announcement that Ford has launched a \$100,000 industrial atomic power study. The company will cooperate with the Atomic Energy Commission on exploring atomic reactor fuel element fabrication.

Under the program, the company will study the specifications of fuel elements for reactor designs and techniques for fabricating these elements to determine the degree to which simplification and standardization may be effected. The company, in addition, will recommend, where possible, use of mass production processes.

NADA Announces Dates For 1956 Convention

The National Automobile Dealers Association expects to break an attendance record when it holds its 39th annual convention in Washington, D. C., from Jan. 28 through Feb. 1. Both business sessions and the equipment exhibition will be held in the Sheraton Park Hotel, and President Eisenhower is scheduled to be the main speaker.

Piasecki to Offer Civil Model Of H-21 Work Horse Helicopter

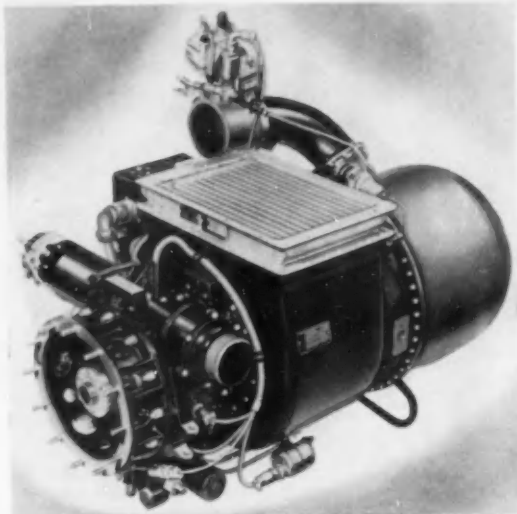
Piasecki Helicopter Corp. has announced that it will build a commercial version of its H-21 Work Horse heavy duty, military helicopter. The civil version, scheduled for initial delivery in 1956, will be known as the PH-42.

It will be made available in a variety of seating arrangements ranging from a 16-seat version to the standard 19-seat model as well as in passenger-cargo and all-cargo versions.

The PH-42 will carry mail and baggage externally in a detachable "Helipack" under the fuselage, thus

DOUBLE-DUTY POWER PLANT

This dual-purpose AiResearch gas turbine power plant is a major contributor to the performance of the new Martin Sea-Master jet attack plane. It delivers pneumatic power to start the plane's main engines as well as electrical power at the same time.



making available additional cabin room for passenger comfort. In addition, the external pack will serve to speed loading and unloading as passengers can place their baggage in the 80 cu ft pack before entering the cabin.

Like its military counterpart, the Piasecki PH-42 is a single-engine helicopter with two 44-ft diam, counter-rotating, three-bladed, fully articulated rotors which are longitudinally disposed. The fuselage is all metal, stressed-skin construction.

A 300-gal fuel tank is located at the rear of the passenger-cargo compartment, and is separated from the power plant compartment by a stainless steel firewall. The landing gear is a nose-wheel, tricycle type with wide tread for ground stability, and individually-operated hydraulic brakes are installed on the main wheels.

The nine-cylinder Wright Cyclone 863C9HD-1 radial aircooled engine, which develops 1425 hp for take off, is mounted in a normal attitude. Engine torque is transmitted to the rotors through a clutch assembly to a gear box located amidships, and thence, by means of drive shafting, to reduction gear boxes located below each rotor hub. All flight controls are hydraulically actuated.

Detroit Aviation Exposition Features Planes and Vehicles

Jet fighters, interceptors, and bombers, as well as many types of aircraft powered by piston engines, precision flying teams, foreign and domestic business and pleasure planes, guided missiles, tanks, anti-aircraft artillery, and a host of other displays entertained audiences at the recent Eighth International Aviation Exposition. The mammoth air show was held at the Detroit-Wayne Major Airport on July 2, 3, and 4.

A large and massive display of air strength was put on by the Strategic Air Command. Included in its portion of the program was an in-flight refueling demonstration with a KC-97 tanker hooking up its boom to a B-47 jet bomber.

Army Ordnance presented a static as well as a running display of its latest wheeled and tracked vehicles. These were provided by the Detroit Arsenal, Ordnance Research and Development Center at Center Line, Mich. Among the vehicles displayed were the M38A1 Jeep with the 106 MM BAT Weapon, M41, M47, and M48 tanks, M75 armored personnel carrier, and M2521 tractor and trailer.

(Turn to page 166, please)



AUTO-LITE SERVES INDUSTRY

... WITH MORE THAN 400 PRODUCTS

OF THE HIGHEST QUALITY

From the early days of the automotive industry, Auto-Lite has earned a reputation for building products of the highest quality and dependability for cars, trucks, tractors, planes and boats, as well as for our government and industry. That quality is reflected in the public acceptance of

the name Auto-Lite—the best-advertised name in the automotive aftermarket. It is reflected, too, in the established Auto-Lite service facilities throughout the world. Today's buyers know "You're Always Right . . . With Auto-Lite."

THE ELECTRIC AUTO-LITE CO., Toledo 1, Ohio



Manufacturers of...

BATTERIES • BUMPERS & GRILLES • CASTINGS—Gray Iron, Zinc and Aluminum • HEADLIGHT DIMMERS • FUEL PUMPS • GENERATORS
HORNS • IGNITION UNITS • INSTRUMENTS & GAUGES • LIGHTING UNITS • METAL FABRICATED ASSEMBLIES • MOTORS—AUTOMOTIVE FRACTIONAL • STARTING MOTORS • SPEEDOMETERS • SPEEDOMETER CABLE • PLASTICS • SEAT AND WINDOW MOVING MECHANISMS
SPARK PLUGS • SWITCHES • WINDSHIELD WIPERS • WIRE & CABLE

ENGINE COMBUSTION PROCESSES

Analyzed at International Conference

CURRENT problems of combustion in piston engines and gas turbines were tackled by engineers and scientists from seven countries during the International Conference on Combustion June 15-17 at Massachusetts Institute of Technology, Cambridge, Mass. The three day engineering sessions were sponsored by the Institution of Mechanical Engineers (England) and the American Society of Mechanical Engineers. A similar conference with the same papers will be held Oct. 25-27 in London.

Variety of Subjects

Among the subjects discussed at the piston engine meeting were high compression turbocharged spark-ignition gas engines, surface ignition, compression products and wear in high-speed compression-ignition engines, combustion in Diesel, gasoline engines and dual-fuel engines. Three papers also were devoted to Diesel engines with divided combustion chambers.

Authors of British and European papers included Dr. W. T. Lyn, British Internal Combustion Engine Research Association; Heinz Hoffman, director of engine research, Daimler-Benz A.G.; Dr. H. Lang, Lanova G.m.b.H.; Dr. O. Cordier, in charge of development of high-speed engines, Klockner-Humboldt-Deutz, A.G.; Dr. R. Vichnevsky, French scientist; N. P. W. Moore, London Imperial College of Science and Technology, and R. W. S. Mitchell, chief development engineer, Diesel Engine division, The English Electric Co., Ltd.

Surface Ignition Tests

MIT engineers reported on their investigation of surface ignition in a motored engine. They found that benzene is the most resistant to surface ignition and other fuels in the following order—iso-octane, N-heptane, diisobutylene, ethanol, with methanol the least resistant.

The most significant development within the past two years in gas engines, according to W. M. Kauffmann, chief engineer of the engine division, Worthington Corp., has been the wide acceptance of the fully turbocharged and self-sustained two-stroke spark-ignition powerplant. Research output tests in excess of 135 bmeep have been demonstrated with fuel economy of 7000 Btu per bhp-hr at maximum load, using a poppet valve uniflow scavenging system.

New Engine

A new type of engine—Tripower—has been developed as the result of the recent demand for a versatile power unit readily switched from Diesel to dual-fuel and ultimately to spark-ignition, or vice-versa. This engine, which was described by Mr. Kauffmann, has four valves, a spark plug in the center of the head, and operates with a compression ratio of 12 to 1.

A comprehensive analysis of divided combustion chambers in Diesel engines was presented by three German engineers. The Daimler-Benz form, Acro and Lanova forms, and the Deutz swirl-chamber type were used as the basis for comparison with other combustion chambers of related design.

Dr. Vichnevsky, of France, in his paper advocated more intensive fundamental research of combustion in a gasoline engine to provide the automotive engineer with adequate technical data so he would know how it is possible by a convenient modification of the design of the cylinder head or of the ignition system, and by choice of the chemical structure of the fuel, to obtain the best efficiency in the range of the lean mixtures.

Turbulent Flame Properties

At the session on gas turbine combustion, new techniques for measurement of turbulent flame properties and high temperatures were presented in two papers. Bela Karlovitz, Combustion and Explosives Research, Inc., described the application of electronic probes to measure turbulent flames. A variety of measurements in flames can be made with this instrument, including the distribution of time which the instantaneous combustion wave spends with any small interval of the flame brush. Another important use is the measurement of the fullness of flames. The fullness of a flame is a new concept and is defined as the fraction of time during which the combustion wave is present somewhere along a line that traverses the entire flame brush.

During measurement in a flame, the electronic circuit amplifies the current received by the probe, eliminates the weak current collected from the hot gas, thereby forming the required signal, and measures the desired average quantities.

Thermocouples for High Temperatures

How iridium versus iridium-rhodium thermocouples can be used to measure temperatures up to
(Turn to page 153, please)



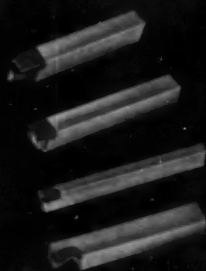
GROUND
MULTIPLE
THREAD
MILLING
CUTTERS



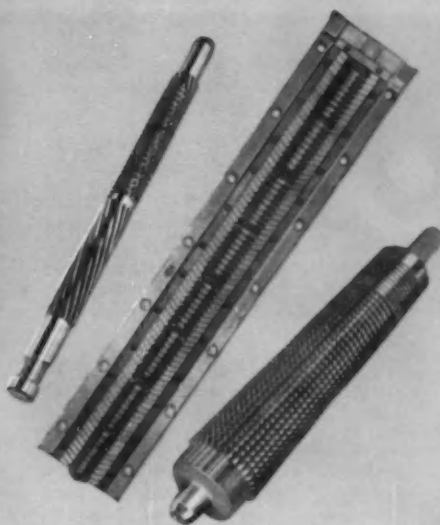
FORM RELIEVED
MILLING CUTTERS



SINGLE POINT
TOOLS



FORM TOOLS



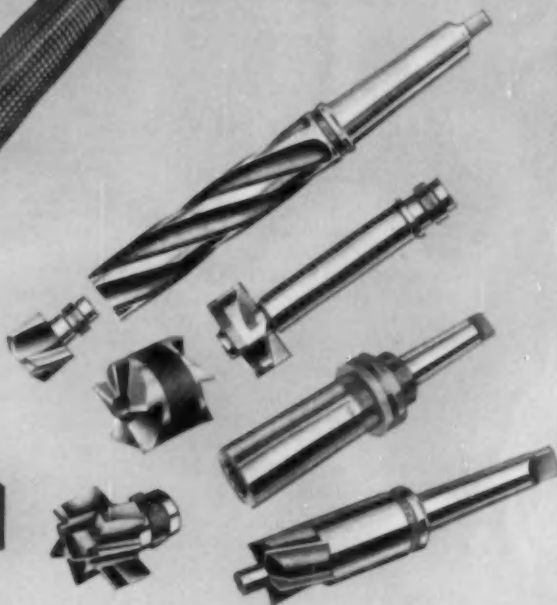
BROACHES



FACE MILLS



CONTINENTAL DRIVE TOOLS



Why These Cutting Tools are *Production Proved*

- Continental is an Ex-Cell-O subsidiary.

As such, we are constantly trying out new tool designs, new methods, in Ex-Cell-O's big parts production shops.

There could be no finer "proving ground" for testing new materials and new methods. There are no finer cutting tools than "Production-Proved" tools by Continental.

Call in your Ex-Cell-O representative or contact Continental in Detroit for information about them.



55-17

Continental

TOOL WORKS

Division of Ex-Cell-O Corporation, Detroit 32, Mich.



Chrysler Div., Chrysler Corp.—M. T. O'Donnell was elected vice-president and Clare E. Briggs was elected vice-president in charge of sales.

MEN in the NEWS

(Continued from page 45)

Lockheed Aircraft Corp.—Bert W. Holloway has been appointed corporate director of advertising, publicity, and promotion, while C. E. W. Stevens has been named corporate advertising manager.

Douglas Aircraft Co., Inc.—W. H. P. Drummond has been named assistant director of engineering.

Campbell-Ewald Co.—Thomas P. Rhoades has been appointed director of public relations.

Eaton Mfg. Co., Axle Div.—Gustav W. Carlson has retired as chief engineer.

Allegheny Ludlum Steel Corp., Sales Div.—Richard J. Swan has been made director of sales for magnetic and electronic materials, and Milton M. Fenner, Jr., has been named director of sales for tool and die steels.

American LaFrance Corp.—Gerald J. Halpin, Sr., is now vice-president in charge of sales.

Kaiser Metal Products, Inc.—Felix A. Chardon has been named manager of aircraft quality control.

Aluminum Industries, Inc.—Thomas L. Humble has been appointed vice-president and general manager in charge of production.

Axelson Mfg. Co.—Douglas C. Lane is now sales promotion and advertising manager.

Lincoln Div., Ford Motor Co.—James M. Woodman, Jr., is now assistant general sales manager in charge of advertising, sales promotion and training.

Behr-Manning Div., Norton Co.—Thomas Trowbridge was named assistant general sales manager; William J. Bennett, sales manager of the eastern region; and Victor F. Perreault, industrial trades manager.

Diesel Energy Corp.—Maximilian B. Bauer was elected a director and appointed vice-president.

Waukesha Motor Co.—John P. Kelly is now chief draftsman of the Engineering Dept.

Studebaker-Packard Corp., Styling Div.—Richard S. Teague is now Packard director of styling; Duncan McRae, Studebaker director of styling; and Donald S. Beyreis, director of styling-interiors.

White Motor Co., Truck Div.—P. E. Tobin has been appointed general sales manager.

Waldes-Kobinor, Inc.—Jacob Cooperman has been elected treasurer, while Catherine E. Banks has been elected assistant treasurer. James E. Fitzgerald has been named credit manager.

AP Parts Corp.—H. C. Stivers has been appointed sales manager.

Blue Crown Spark Plug Corp., Spark Plug Div.—Howard Vogel is now manager.

Purolator Products, Inc.—Henry J. Hufnagel has been appointed comptroller.

Radioplane Co.—Stuart E. Weaver has been elected vice-president in charge of engineering, and John R. Jacobsen was made assistant vice-president of engineering.

Lincoln Div., Ford Motor Co.—Douglas F. Allison has been appointed programming manager.

Piasecki Helicopter Corp.—Don R. Berlin has been elected president and chairman of the board; Wesley R. Frysztacki, vice-president and secretary; Harry S. Pack, vice-president; Lee L. Douglas, vice-president; Gareth W. Speer, vice-president, treasurer, and assistant secretary; William Davey, vice-president; Hamilton W. Lord, controller; and John O'Hara, assistant secretary.

Allis-Chalmers Mfg. Co.—William A. Yost, Jr., has been made vice-president, staff operations.

Sprague Electric Co.—Albert H. Postle has been named sales engineer for ceramic capacitors and printed circuits.

Martin Aircraft Co.—Adolph Vleck, Jr., has been named tooling manager.

Great Lakes Stamping & Mfg. Co.—Benjamin Z. Ranan has been named general manager.

Aluminum Industries, Inc.—Robert Diefendorf has been elected treasurer.

(Turn to page 186, please)



(Continued from page 41)

Fruehauf Trailer Co. has put a new bulk cement transporter into production. . . . Construction Equipment Div. of Baldwin-Lima-Hamilton Corp. has introduced a new 1/2 cu yd power shovel.

* * *

Westinghouse Electric Corp. has unveiled an electric power plant mounted on two railway cars.

* * *

Rail-Trailer Co. has teamed up with Clark Equipment Co. to develop the latter's new Mobilvan container system for rail-highway freight transportation.

* * *

Dewey and Almy Chemical Co. recently produced its 700 millionth Darak battery separator.

* * *

Barber-Colman Co. held "open house" recently at its new Park plant, which houses the Uni-Flo Air Distribution Div.

* * *

Curtiss-Wright Corp. is moving ahead rapidly with plans for jet engine testing facilities and a manufacturing operation (not jets) on its recently acquired 50,000-acre site near Emporium, Pa.

* * *

General Electric Co. is launching a coordinated industrial sales program for nuclear reactors.

* * *

Rochester Products Div. of General Motors Corp. has completed a new two-story administration building. . . . Douglas Aircraft Co. will erect a \$500,000 office building at its Santa Monica Div.

* * *

Contracts have been signed for the operation of a new automobile speedway to be erected at Daytona Beach, Fla. Present plans call for its opening on July 4, 1956.

* * *

New Products Corp. is now occupying a new plant in Skokie, Ill. It is currently concentrating on the development and manufacture of special control devices for cars to be installed as original equipment.

* * *

Aluminum Body Corp. has formed a subsidiary known as A.B.C. Plastics, Inc. It will primarily supply truck and trailer body parts of plastic to the parent company.

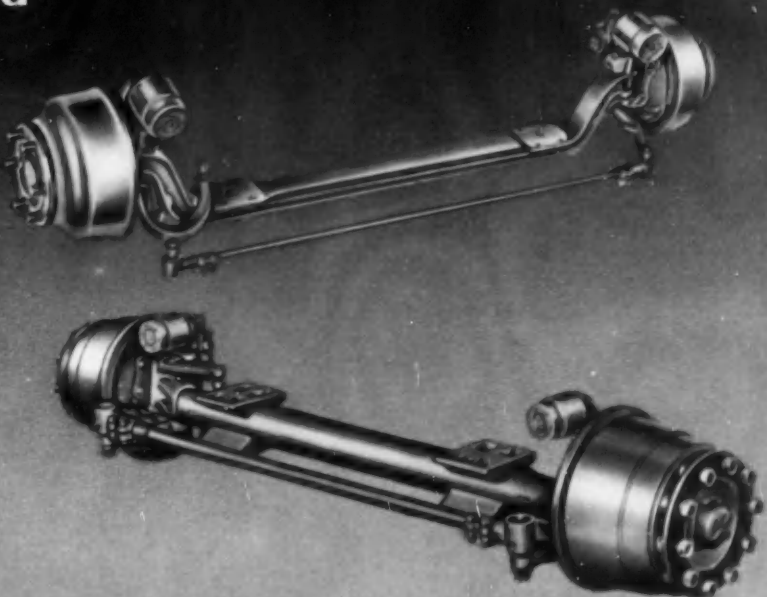
(Turn to page 188, please)



Known and Respected

A whole automotive generation—especially men who operate vehicles for revenue—knows and respects Clark Front Steering Axles. Veteran "shock troops"—out in front, absorbing the punishment of modern heavy-duty transport at high speeds.

It is Clark policy that these axles shall continue to command respect by generations to come—and that it shall be, as in the past, good business to do business with Clark



CLARK EQUIPMENT COMPANY • BUCHANAN • Battle Creek, Benton Harbor and Jackson, Michigan



Announcing the Clark-Ross Y-200- DESIGNED SPECIFICALLY For 20,000 lb. Jobs!

CHECK THESE FEATURES:

Heaviest uprights in the industry: Hi-tensile steel channel specially rolled for this truck.

Shortest turning radius: 15 feet; shorter than any other comparable truck.

3 in. thick steel steer axle.

10 in. underclearance of uprights, plus excellent weight distribution, permit operations under most severe yard conditions.

Safety check-valve built-in: a Clark-Ross exclusive; impossible to drop the load because of line failure.

Planetary gear drive: takes the strain off the axle; all drive components protected.

Extremely easy to service: hydraulic cylinder serviced from bottom, no need to remove uprights; engine and hydraulic system easily accessible.

From the ground up, the Y-200 is a genuine 20,000 lb. truck—not merely a beefed-up truck of less capacity. Pre-production models have been job-tested for nearly a year at steel mills, saw-mills and wood treating yard.* These trucks have proved their ability to cut handling costs under the toughest conditions. We are frank to say that we believe the Y-200 will give you better performance, at less cost, than any comparable machine. We invite your comparison: Simply call your local Clark dealer, listed under "Trucks Industrial." Or write us direct. There's no obligation.

*Name supplied on request.

**CLARK
EQUIPMENT**

ROSS CARRIER DIVISION
Industrial Truck Division
CLARK EQUIPMENT COMPANY
Bottle Creek, Michigan



"Yes, we'll even ship elephants!"

Everything goes—by UNITED AIR FREIGHT!

From heavy machinery to cabbages, you can ship practically anything by fast, economical United Air Freight. And here are some of the reasons why it pays:

Decreased unit weight—lower crating costs, or none.

Wider marketing—through quicker delivery.

Lower warehouse expense—because you can ship direct to distributors and customers.

Faster turnover—lower inventory, less money tied up in goods in transit.

Only United provides one-line air service linking the East, the Midwest, all the Pacific Coast and Hawaii—also fast connections with other carriers to speed your goods nation-wide, or anywhere in the world.

➔ Learn more about the advantages of United Air Lines Air Freight Service—call your nearest United representative or write for free booklet, "Industry's Flying Partner," Cargo Sales Dept. I-7, United Air Lines, 5959 S. Cicero Avenue, Chicago.





WAGNER PUTS THE "AUTO" IN AUTOMATION

AUTOMOTIVE MANUFACTURER MODERNIZES WITH WAGNER BROTHERS AUTOMATIC PLATING SYSTEM

If your metal finishing operations are still being carried on with obsolete equipment which loses money for you every day, we can put you ahead of your competition, increase your profit margin.

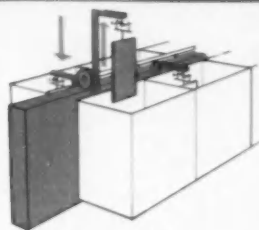
Increased production lowers the unit cost of your parts processing operations — you spend less for labor, less for power and increase your capacity to handle more business.

Wagner Brothers Full Automatic* Electroplating systems offer you a new and revolutionary concept in high-volume plating mechanisms — the product of years of engineering research and design refinements — for completely automatic cycling of your metal finishing operations.

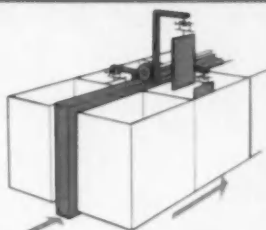
*Patents Pending

Basic design details of Wagner Brothers Automatic Plating systems are described and illustrated in Bulletin 50-54, available free upon request.

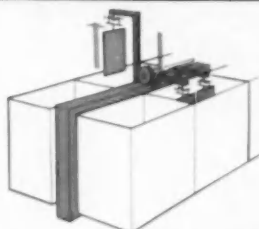
This fully automatic plating system was recently installed at a Bay City, Michigan plant for one of the world's largest manufacturers of passenger cars. The unit is 203 feet long, 11 feet wide and operates under 16-foot head-room. Die cast parts are continuously processed through a 40 station copper-nickel-chromium cycle. Production rate is 100 racks per hour, using racks 24" long, 10" wide and 64" deep. Power is furnished by one 25-HP motor. Unit is provided with a push-button central lubrication system, built-in rack stripper, vertical and horizontal agitation. Racks are automatically loaded, unloaded.



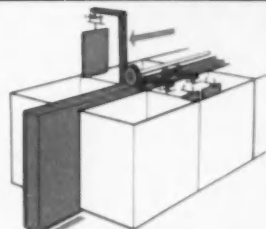
1st VERTICAL MOTION



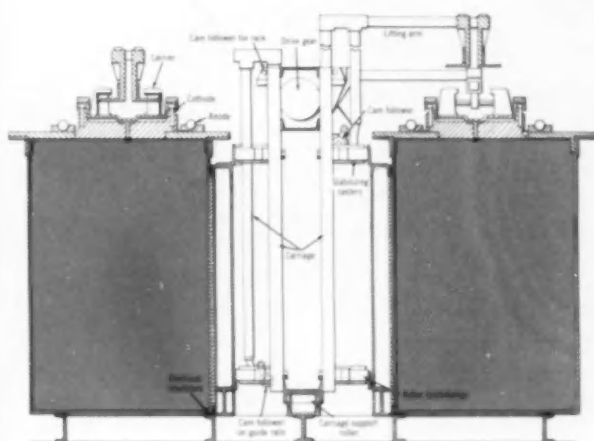
1st HORIZONTAL MOTION



2nd VERTICAL MOTION



2nd HORIZONTAL MOTION



The entire carriage mechanism is suspended on rollers moving in an oil-filled channel track. This carriage is motivated by a hydro-motor mounted at the base of the machine, fitted with a crank and link to translate the simple harmonic motion of the motor shaft to the in-line reciprocating action of the carriage.

In addition to high-volume plating, the Wagner Brothers Automatic is equally well-suited to anodizing (sulfuric and chromic), phosphate coating, etching, electropolishing, oxide coating, etc.

HOW IT OPERATES

All transfer and conveying mechanism is mounted on a reciprocating carriage located between the two rows of tanks. Two basic movements bring parts through the full plating cycle, one forward and reverse straight line horizontal motion and one raising and lowering vertical movement.

Plating racks are attached to work-carriers at the loading station. When the machine is started, lifting arms fixed to the carriage engage the work-carriers being transferred and lift them at all points on one side of the machine, carry them forward to the next station where they are lowered and disengaged from the lifting arm. Sequence is simultaneously produced in reverse on the opposite side so that, when lifting arms are lowered on one side, they rise on the other side.

ADVANTAGES and FEATURES

SMOOTH OPERATION — Hydromotor power principle *eases* parts through the plating cycle without jolting starts and stops. Parts never jar from work-carriers into tanks.

LOW POWER NEEDS — Almost perfect balance of work load being lifted at one time requires only *low hydraulic pressures*. One 25-HP motor operates the 203 foot automatic shown.

SIMPLE INSTALLATION — Automatics are delivered to your plant either intact or in 2 or 3 completely assembled sections, depending upon size. *You avoid costly installation.*

MINIMIZED MAINTENANCE — There are fewer moving parts, no vibrating parts, no backlash in automation, low hydraulic pressures, no alignment problems. Overload protection is built into the hydraulic pump. Working parts are easily reached without disassembly.

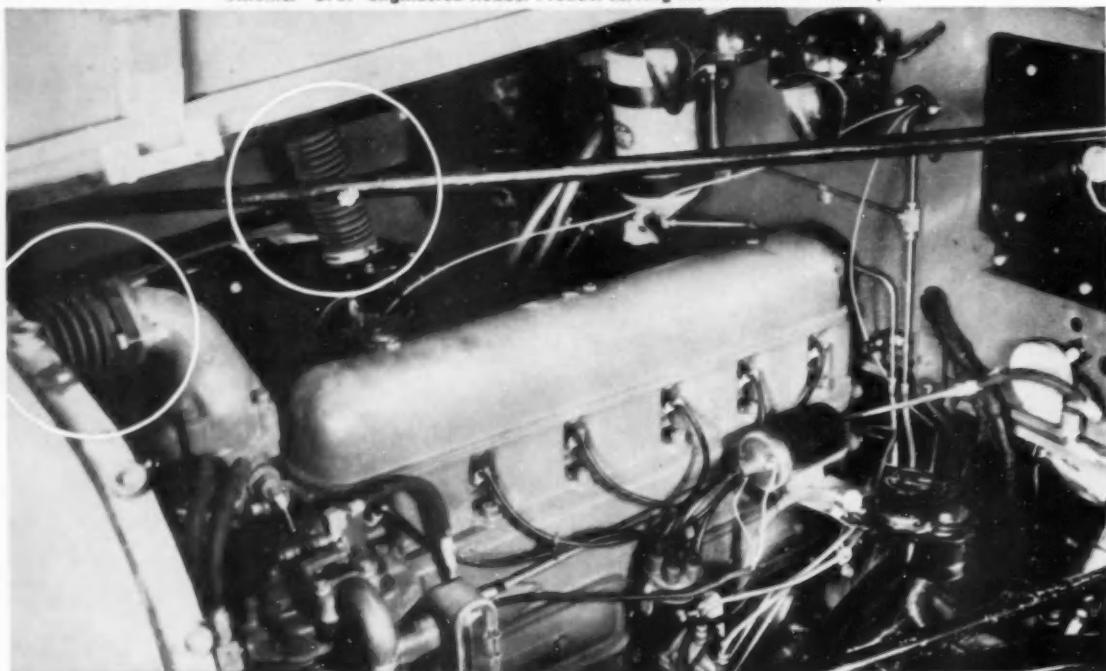
OTHER FEATURES —

OPERATES UNDER LOW HEAD-ROOM REQUIREMENTS • NO OIL-DIPPING CONNECTIONS OVER TANKS • TRIPLE CONTACT CATHODE BARS FOR SMOOTH CURRENT FLOW • AUTOMATIC HEAT CONTROL FOR ACCURATE RESULTS • CENTRAL LUBRICATION SYSTEM • EASILY VARIED DRAG AND DWELL TIME

WAGNER BROTHERS, INC.

400 MIDLAND • DETROIT 3, MICH.

Another "U. S." Engineered Rubber Product serving the automotive industry



U. S. MULTI-FLEX connectors

take up the stress and strain of engine vibration

U. S. Multi-Flex® connectors are flexible, accordion-like parts that "give"—thereby relieving automotive piping from the strain and fatigue brought on by engine vibration and torque reactions, bumps, quick starts, sudden stops.

Here Multi-Flex is shown as a connection between the cast tubular line from the radiator and engine tubular line. Here Multi-Flex allows the engine to move without transmitting force, both laterally and fore and aft on the radiator. A rigid piece of hose would exert great leverage force on the radiator and radiator tank.

Multi-Flex is used on carburetor air intakes, as boots for hydraulic pistons, shock absorbers, worm gears and sensitive adjusting screws, exhaust outlets, and many, many more. The Multi-Flex boot has an extension-compression ratio of over 3 to 1—without

the strain or fatigue that quickly destroys other types of so-called "flexible" tubing.

Natural or synthetic rubber Multi-Flex can be fabric-reinforced, since it's made without molds, special mandrels or supporting wires. It can be produced in inside diameters from $\frac{1}{8}$ " to 36" in required lengths. Can be constructed to withstand temperature range of -65°F to 500°F.

Multi-Flex is available with flanges at either end; it also can be fastened in the conventional manner with clamps. Unlike wire-supported hose, it can be repeatedly crushed without damage. For all-around flexibility, for the smoothest "travel" in a connector, specify Multi-Flex. Most samples for experimental use can be made without tooling charges. For samples and engineering service, phone us in Detroit at Trinity 4-3500.



"U.S." Research perfects it... "U.S." Production builds it.

UNITED STATES RUBBER COMPANY

Automotive Sales, Mechanical Goods Division • New Center Bldg., Detroit 2, Michigan



Superior
Stainless

SuVenner®
Copper Clad Metal

SuVenner®
Brass Clad Metal

Superior Strip Steels

basic materials

in modern product fabrication—wherever

lower costs

higher performance

better appearance

are vital to sales

The almost limitless range of fabrication provided by Superior Stainless and SuVenner® Clad Metals makes these materials truly basic in metal product design and manufacture. Each Superior coil represents precision manufacture at its best—strip accurate in gauge, width and specified finish—uniform in composition—exact in temper for your particular need. *Check with us!*

"QUICK FACTS on Superior Strip Steels" . . . and
"An Introduction to Clad Metals" . . . two useful, free
publications you should have. Write for them today!



Superior Steel

CORPORATION

CARNEGIE, PENNSYLVANIA

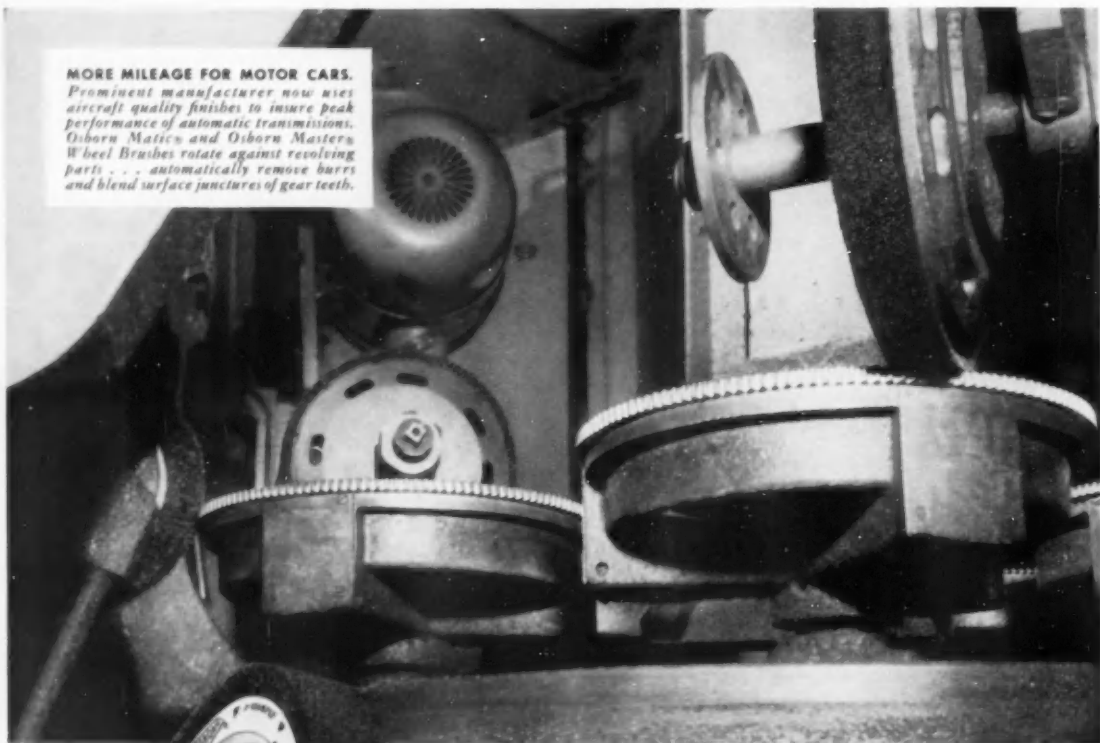
SUPERIOR PRODUCTS

Hot Rolled and Cold Rolled Strip Steels

- Stainless of all Analyses
- SuVenner® Clad Metals
- Alloys, Spring Steels and Specialties

MORE MILEAGE FOR MOTOR CARS.

Prominent manufacturer now uses aircraft quality finishes to insure peak performance of automatic transmissions. Osborn Matrics and Osborn Masters Wheel Brushes rotate against revolving parts . . . automatically remove burrs and blend surface junctures of gear teeth.



Osborn Matrics . . . Industry's Most Efficient Brushing Tool

FINISHING TOUCH...automatically adds aircraft quality to production

Important benefits an OBA could add to your products

Doubles endurance limits. Records show that sharp corners, tool and grinding marks can reduce endurance limits of machine parts as much as 60%. Many manufacturers of other products now require aircraft quality finishes in the range of 4 to 7 microinches to insure peak endurance on highly stressed parts at maximum economy in production.

Parts are now simply rotated against revolving Osborn Power Brushes on preset time cycles. Sharp edges or surface junctures are uniformly blended, eliminating causes of stress concentrations and possible failure. Small metal particles are removed, avoiding subsequent fouling of hydraulic and lubricating systems.

The power brushing operation is simple . . . requires only loading and removing the part.

Whatever the type of product you build, Osborn Power Brushing can improve quality and cut cost of manufacture. An **OBA, Osborn Brushing Analysis**, of your job will show you how. Write *The Osborn Manufacturing Company, Dept. E-31, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Osborn Brushes®



BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES
BRUSHING MACHINES • FOUNDRY MOLDING MACHINES

Plastic Truck Body

(Continued from page 98)

1½ ounce mat with a 1/64 in. glass cloth overlay on all bolting flanges. The floor molding is made of six layers of glass mat. The percentage of resin to glass is on the order of 62 to 38 giving a finished piece of material that is approximately ¼ in. thick. The entire finished body, including the aluminum parts, weighs about 700 lb.

For the vacuum bag molding technique used on the production model, reinforced plastic molds are utilized for the most part. These molds, made with epoxy resins, are drilled at various locations for the evacuation of air. Tubing is attached from the holes to a vacuum pump; separators are used in the system to collect any excess resin that may be drawn into the lines from the polyester-glass layup.

During the first production phase, the molds are completely waxed using Simonize paste wax or equivalent. The next step in the procedure is the spraying of a gelcoat over the surface of the mold. Fiber glass is then manually laid up over the gelcoat. Plaskon resin with color added is then spread over the entire surface by means of a roller or brush, depending on the contour of the surface.

A plastic bag is then placed over the entire work surface and sealed by means of a steel ring around the edges of the mold. Air is then evacuated between the layup and the bag. A bleeder ring around the side of the molded part assists in removing air and excess resin from the workpiece.

The plastic bag is used only once, since any degradation of the bag during the vacuum cycle will have a tendency to adversely affect the plastic end product. Each bag is inspected during use; and for such small defects as pin holes, pressure sensitive cellophane tape is utilized for the repair.

During the curing cycle, a hot air heater may be used to cure the plastic material. All parts are post cured at 180 F to insure a better laminate. After the piece is completely hardened, it is sent to the trimming and finishing department.

As a matter of interest, it takes six man-hours to manufacture the side panel, six man-hours for the floor, three to four for the front end molding, and five man-hours for the cab.

First in performance
for automatic muscle jobs
like these...

T-J

Spacemaker CYLINDERS OFF SHELF DELIVERY

PUSH



PULL



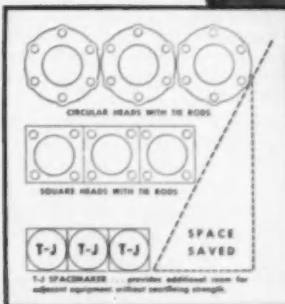
LIFT



- OIL pressure to 750—AIR to 200 P.S.I.
- New Compact Design . . . Saves up to 40% Space
- Proven Performance . . . with Extra High Safety Factor
- Super Cushion Flexible Seals for Air . . . New Self-Aligning Adjustable Oil Cushion
- Hard Chrome Plated Bodies and Piston Rods
- The Only Cylinders with all the Extras as Standard

T-J Spacemaker Cylinders get first call for an ever-widening range of power movement jobs in industry today—because they're so advanced in design . . . so efficient and dependable in performance. Wide selection of styles and capacities. Check your needs now! Send for bulletin SM-454-2. The Tomkins-Johnson Co. Jackson, Mich.

Raise	Open
Lock	Time
Brake	Blank
Press	Cut
Spin	Broach
Turn	Drill
Grind	Sequence
Weld	Close
Lower	Snub
Squeeze	Form
Bend	Pierce
Coin	Feed
Saw	Mill
Tap	Convey
Index	etc.
Brake	



Member of the National Fluid Power Association

T-J

TOMKINS-JOHNSON

DISTRICTS AIR AND HYDRAULIC CYLINDERS CUTTERS CLIMBERS

Canadian Plant V-8 Engines

(Continued from page 76)

the cylinder head line. Both machines feature mechanical planer type drive for the ram. The cylinder block broach uses a 350-hp motor generator set for the drive; the cylinder head machine has a 300-hp motor generator drive.

Blocks then proceed directly into a large 16-station Sundstrand transfer machine, arranged in three major

sections. The first stage drills and reams two locating holes to provide the locators for all succeeding operations. This is gaged from the bearing locks which are held to a tolerance of 0.001 in. in the broaching operation. In addition, this section mills pads and sides of bearings. The second section of the machine has eight inclined boring heads for rough- and

semi-finish boring of cylinder bores. Interesting feature of this section is the built-in Taft-Peirce inspection station. It automatically gages the bores before the block enters the third section.

For the last section of the Sundstrand transfer machine, the blocks are turned 90 deg to present the front and rear ends for milling to length. The machine includes three inspection stations; and two rollover stations.

At this point the blocks enter the Cross Transfer-matic, mentioned earlier, and upon completion of the cycle go through a large five-stage Centri-Spray washing machine. Interesting detail here is the application of an anti-rust compound that is said to protect the block effectively.

The set of main bearing caps, previously prepared on an adjacent line, now is installed and the blocks proceed through a six-station W. F. & John Barnes transfer machine for rough- and semi-finish boring of cam and crank line bores. In addition, this machine grooves the rear main bearing.

A Modern press installed on the line is used to press in the camshaft bushings and this is followed by finish-boring of cam and crank bore lines in a three-station W. F. & John Barnes machine.

Following the latter operation the blocks are fed through a small horizontal Cincinnati surface broaching machine for a final finishing cut on the cylinder banks. The next step is precision-boring of cylinder bores, this being done in a 16-spindle Ex-Cell-O with a set of rough- and finish-boring cutters on each spindle, holding size to a tolerance of 0.0002 in.

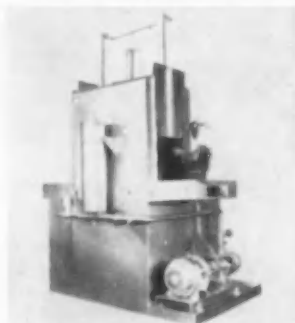
The last major step is the honing of bores in Micromatic Microsize honing machines. As illustrated, each one has four vertical spindles, the block being indexed in the fixture to complete both banks of bores. Surface finish is held within limits of 15 to 35 micro-inch. Finally the honed bores are checked and graded by means of a four spindle Sheffield Precisionaire gaging machine.

Blocks then are given a final wash in another Centri-Spray machine. Before blocks are ready for the assembly line, the flywheel housing is attached and the pilot bore and flange face are given a finish cut in a special Baker machine. Since engines are built to take either Powerglide or manual shift transmissions, the Baker machine has two stations—one for each type. This operation assures perfect alignment of the power train.

Cylinder heads are completed, in

P-D "CLEAN AS A WHISTLE"—

ELIMINATE CHANCE From Your Between-Operation Cleaning or Paint Preparation Needs... Whether Large or Small



P-D UNIT FOR CLEANING AERONAUTICAL CYLINDER HEADS

Peters-Dalton Power Spray Washers
Are Designed and Built
To the Job and For the Job

Modern metal finishing standards require washing equipment tailor-made for specific operations. This is essential to obtain the necessary product quality. It is too costly to take "chances" with the performance of these vital operations. All "chance" can be removed when you call upon Peters-Dalton engineers. They can and will specify the correct design and build the right type equipment to fulfill your own particular needs.

More than a quarter century stands behind P-D "know-how" for manufacturing equipment to handle your between-operation cleaning or paint preparation requirements. Peters-Dalton designers and engineers will lay out and produce the correct type of equipment to handle your job regardless of its size — whether a single unit or a complete installation. Depend on P-D to supply the services for meeting the production you have the right to expect. Just write, wire or phone.

Ask for our new Power Spray Washer Tech. Bulletin No. 301



- Hydro-Whirl Paint Spray Booths
- Industrial Washing Equipment
- Drying and Baking Ovens
- Hydro-Whirl Dust Collecting Systems



P-D AUTOMOBILE BODY BENDERITE SYSTEM
(photo shows "entering end")

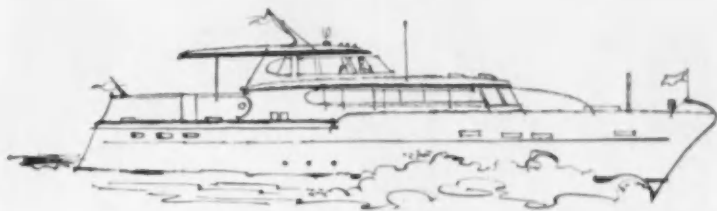




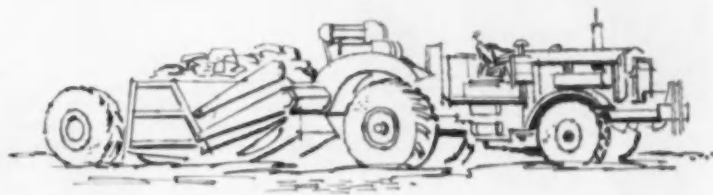
Wherever planes fly . . .



boats run . . .



or heavy tractors haul . . .



AC TachOURmeters are *FIRST and FOREMOST!*

In maintaining heavy on or off-the-road equipment, distance traveled is not too important. What *is* important is total engine operating time. And, AC engineers reasoned, this should be *compensated* engine time, as greater wear naturally results from an engine run at high speeds than from one run at low speeds.

The result was the Tachourmeter first introduced by AC in 1944 . . . and now accepted as the standard wherever engine time must be logged.

This is another example of AC's engineering imagination and know-how in action. Why not consult with AC engineers on any equipment problem you may face in your future planning?

FLINT
1300 North Dort Highway
CHICAGO
Insurance Center Building
DETROIT
General Motors Building

For More Than Twenty Years Nearly Every Make of Car Has Used One or More AC Products

ADAPTERS (Drive) • AIR CLEANERS • AIR CLEANERS AND SILENCERS (Combination) • AMMETERS • BREATHERS (Crankcase) • CAPS (Radiator Pressure) • FLEXIBLE SHAFT ASSEMBLIES • FUEL PUMPS • FUEL AND VACUUM BOOSTER PUMPS (Combination) • FUEL FILTERS & STRAINERS • GASOLINE STRAINERS • GAUGES—AIR (Pressure) • GAUGES—GASOLINE • GAUGES—OIL (Pressure) • GAUGES—TEMPERATURE (Water, Oil) • OIL FILTERS (Lube) • PANELS (Instrument) • RECIPROCATING VACUUM PUMPS • ROTARY VACUUM PUMPS • SPARK PLUGS • SPEEDOMETERS • TACHOMETERS • TERMINALS (Ignition Wire) • VALVES (Crankcase Ventilation)



AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION

"One day we were using

*14 hand sprayers
...the next day, 2*

"One day we were using

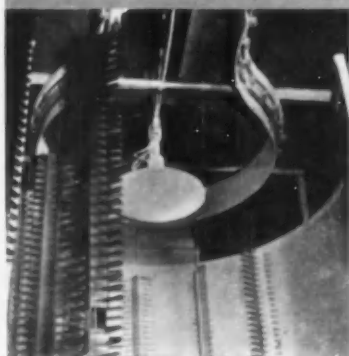
*180 gallons of paint
...the next day, 75*

"Fantastic?" Not exactly. It's a typical, on-the-job-example of the savings made possible with the

RANSBURG NO. 2 PROCESS

Electrostatic Spray Painting

And, in this instance* production was increased; quality of the work improved; and rejections cut to practically nothing.



* Fluorescent Fixtures of California, in their modern plant in South San Francisco, uses the Ransburg No. 2 Process Reciprocating Disc Atomizer to paint their popular line of ALL-BRITE lighting fixtures. The quotes above are from Works Manager, R. M. Shaffer.

Regardless of the type of product you manufacture, if it's painted... and, if your production justifies conveyORIZED painting, you should look into the savings (and improved quality) which can be yours with one of the Ransburg Electrostatic Painting Processes. May we tell you about complete Ransburg services?

Write to Dept. A

Ransburg

ELECTRO-COATING CORP.

Indianapolis 7, Indiana

RANSBURG

the main, in but two major machine operations. First is the broaching of the banks and manifold faces and bosses in the large Cincinnati surface broaching machine. Then the entire sequence of drilling and tapping and facing, as well as drilling of valve guides and valve facing is done in a large, 35-station W. F. & John Barnes transfer machine. Following this, the heads are given a wash, then a pass through a horizontal Cincinnati surface broaching machine for the finish cut on the cylinder bank face. Final steps include processing on the assembly machine for installation of valves, springs, etc., and finally the stud press.

We mentioned bearing caps in connection with cylinder block finishing. Here again McKinnon has a compact arrangement with a minimum of handling. Bearing caps are cast en bloc, five to a set, completing one engine set at a time. The first step is broaching all over—the half-round bore and parting face, sides, and bosses—in a huge vertical type Cincinnati surface broaching machine having three stations. Then the set, still en bloc, is processed through a 17-station Baker transfer machine that completes all of the necessary drilling, facing, counterboring, and tapping operations, parting the caps at the last station.

Time does not permit similar treatment of the other major components such as pistons, connecting rods, camshafts, and crankshafts. Suffice it to say that all of the departments are replete with advanced equipment of familiar types. For example, Heald double-end Bore-Matics are widely used in the piston department; Motch & Merryweather equipment is in evidence for weight-balancing of connecting rods; and a variety of LeBlond crankshaft lathes are found in the crankshaft department.

One of the noteworthy items in the crankshaft department, illustrated here, is a special Kreuger-Barnes oil hole drilling transfer machine. Comprising 18 heads, the machine is fitted with LeLand-Gifford sensitive step-by-step drilling heads and has an automatic cycle that permits the drilling of all oil lines without operator attention.

Additional details of the operation, including comment on the power-and-free conveyor system will appear in a succeeding article.

**AUTOMOTIVE INDUSTRIES
KEEPS YOU INFORMED**



Aetna



Ball Bearings • Roller Bearings • Miscellaneous Parts

Components of NO.1 Quality

for Products of the World's

NO.1 Industry



AETNA BALL AND ROLLER BEARING COMPANY

Division of Parkersburg-Aetna Corporation

4600 SCHUBERT AVE. • CHICAGO 39, ILL.

In Detroit: SAM T. KELLER • 2457 Woodward Avenue

APPROACHING OUR 40th YEAR OF SERVING THE AUTOMOTIVE INDUSTRY

AUTOMOTIVE INDUSTRIES, July 15, 1955

Electronic Disintegrators

(Continued from page 104)

preferably—although not invariably—made hollow to permit coolant under pressure to be forced through the gap. The gap between the electrode and the work is held to a predetermined value (around 0.001 in.) by means of a sensitive servo mechanism.

In die sinking operations, it is now

feasible to start with a fully hardened die block to produce any desired form or cavity by means of a brass forging or master. Since metal removal occurs without any heating of the surrounding metal none of the distortion usually associated with die sinking is present.

In one case, a coining die for an

intricate key pattern was made simply by using several brass key blanks—one for roughing, the other for finishing.

Round, square, or serrated holes in hardened tool steel or carbide die blocks are produced rapidly by using suitably formed brass tools or electrodes. Similarly, holes have been threaded in a carbide block by using a suitable brass screw.

The process has been used for embossing, for stamping identifying legends on carbide blocks or parts.

It also has been applied to production parts. For example, one job called for drilling banks of closely spaced holes in a stainless steel strip. This was done with a multiple-spindle brass tool. Another project involved the cutting of a large number of fine slots, closely spaced in a thin bent strip. This was readily accomplished by the Elox technique after the thin stamping had been fully heat treated and hardened.

It has been applied on large aircraft jet engine stampings for trepanning in relatively inaccessible locations.

Besides its value in die sinking operations, the process has been applied in reverse in the salvaging of worn or "washed" dies. In the latter case, it was a simple matter to produce a number of brass forgings from a good die, using the forging as the electrode. The brass electrode was placed in the old impression, and served to renew the impression by means of electrical discharge machining. This was followed by a finishing operation using a fresh brass forging. All that remained was to take a grinding cut off the faces of the die sufficient to provide the proper depth for the impression.

In summary, the Elox process can be employed for grinding tool forms, for die sinking, and for product machining on parts made of metals and alloys ordinarily not machinable. Since there is no development of heat in the metal adjacent to the cut, there is no distortion and it is no longer necessary to grind or file to finish. It is also claimed that the nature of the surface finish as well as freedom from heat checks impart longer life to cutting tools.

Because the technique is so revolutionary, Elox has established a training school for operators selected by its customers. Here they are taught the basic principles of the technique, operation of the equipment, and a facility for handling the variety of problems that may be encountered.

FLYING REN-ITE

**FOR LOW COST AIRCRAFT
PRECISION TOOLING**

REN-ITE PLASTIC IS THE ANSWER

Ren-ite—the dimensionally stable tooling plastic—is flying high in the esteem of aircraft engineers . . . "Faster", "Easier", "Tooling time cut up to 70%" are some of the claims made for Ren-ite by the Aircraft Industry.



Some Ren-ite aircraft applications—master models, dies, drill fixtures, stretch press forms, routing fixtures, skin panels, checking blocks, checking fixtures, inspection gauges, and assembly fixtures and many others. Ren-ite research is developing many others.

Ren-ite is thermosetting epoxy resin for use as a laminating plastic without application of heat or pressure for general tooling applications . . . unaffected by moisture or temperature change, resistant to acid, alkali, grease or common organic solvent action.

Ren-ite

PLASTICS, INC.

3189 South Cedar Road, Lansing 4, Michigan

Offices in Chicago, Cleveland, Detroit,
Los Angeles, New York and St. Louis





EXTRA VALUE..FROM GASOLINE TO SUN'S METALWORKING OILS

**Sun Oil Company makes over 400 petroleum products
...refines better value into every one of them**

Sun puts the same extra value into its metalworking oils that it puts into famous Blue Sunoco—Premium Performance at Regular Price.

EXAMPLE: About ten years ago Sun became aware of a hidden source of trouble in metalworking... inadequate lubrication of the ways which support the tables or carriages during a machining operation. The costly result of this inadequate lubrication is called "stick-slip" or jumpy table. This stick... slip...stick (or jump) is often less than a thousandth of an inch...hard to detect and yet enough to cause poor finish, rejects, reduced tool life and a fall-off in production.

SOLUTION: Sun developed its now famous Sunoco Way Lubricant—a product so outstanding in its ability to overcome "stick-slip" that today, more than

ten years later, it still is the standard of the metalworking industry.

RESULT: The extra value of Sunoco Way Lubricant has been proved so conclusively that it is approved by more than 55 of the country's leading machine tool manufacturers.

For EXTRA VALUE in petroleum products... buy Sun!

Please turn to the next page



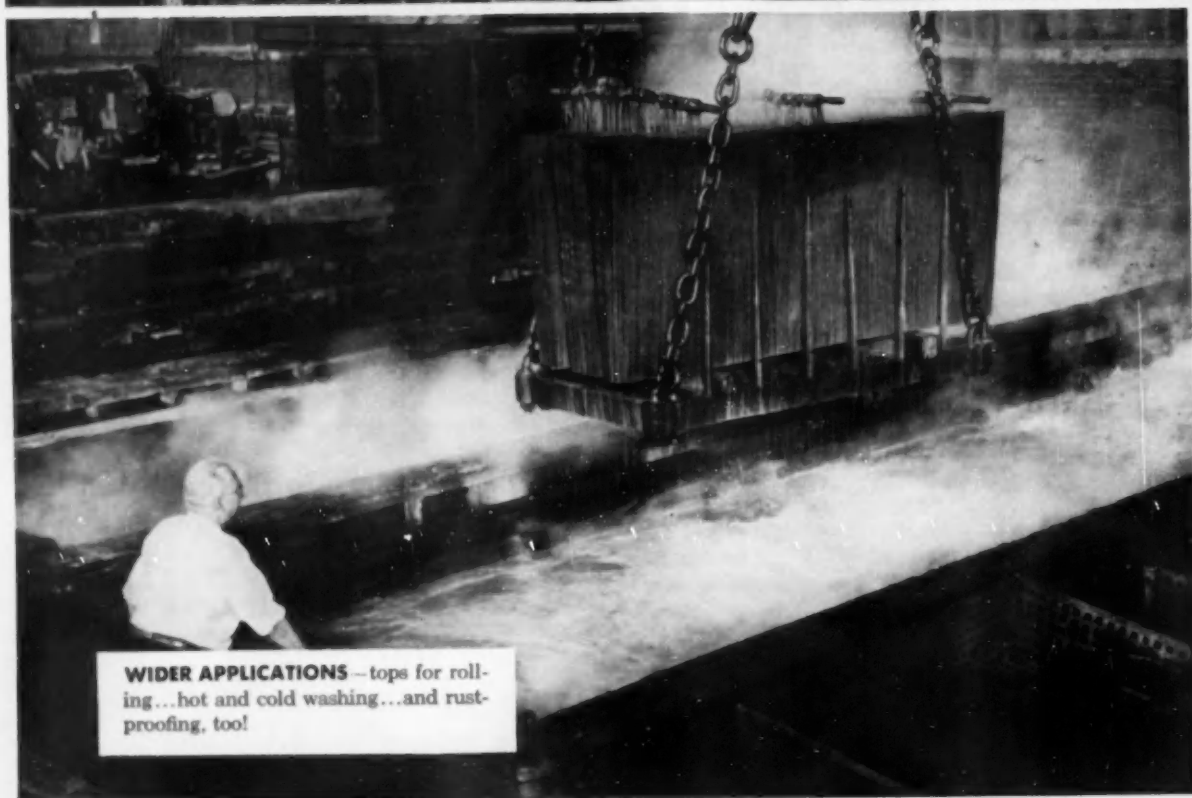
INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY LTD., TORONTO AND MONTREAL



GREATER COOLING POWER—better finishes...tools last longer...production costs reduced.



WIDER APPLICATIONS—tops for rolling...hot and cold washing...and rust-proofing, too!



INCREASED DETERGENCY—prevents loading and glazing of grinding wheels, prolongs wheel life.



NEW S.E.C.O.—pours and mixes easily... has better operator acceptance... keeps parts and machines cleaner.

Industry's most widely used soluble cutting oil continues to give highest machining efficiency

OVER 100 MILLION GALLONS OF S.E.C.O. EMULSIONS USED IN '54

The reasons? Simple.

Primarily, industry has faith in Sunoco Emulsifying Cutting Oil. Its high machining efficiency has proven itself over a period of years. S.E.C.O. is the original 100% petroleum emulsifying cutting oil. Way back in 1916, machinists started using S.E.C.O.

Constantly improving in quality over the years, S.E.C.O. is now better than ever. During 1954 new refining facilities once more improved industry's most widely used cutting oil...gave users even higher machining efficiency...better finishes...longer tool life...increased production.

Test the new S.E.C.O. in your own plant. Notice how its high detergency

and purity keeps tools, parts and machines clean...how easily it mixes in hot, cold or hard water. Notice, too, how S.E.C.O. cuts operating costs...improves rolling operations, hot and cold washing, and rustproofing.

See for yourself why Sun's S.E.C.O. continues to be the leading emulsifying cutting oil in the country today. For information, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. AA-7.



INDUSTRIAL PRODUCTS DEPARTMENT
SUN OIL COMPANY
 PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY LTD., TORONTO AND MONTREAL



COOLIDGE *Balls*

CHROME ALLOY AND STAINLESS

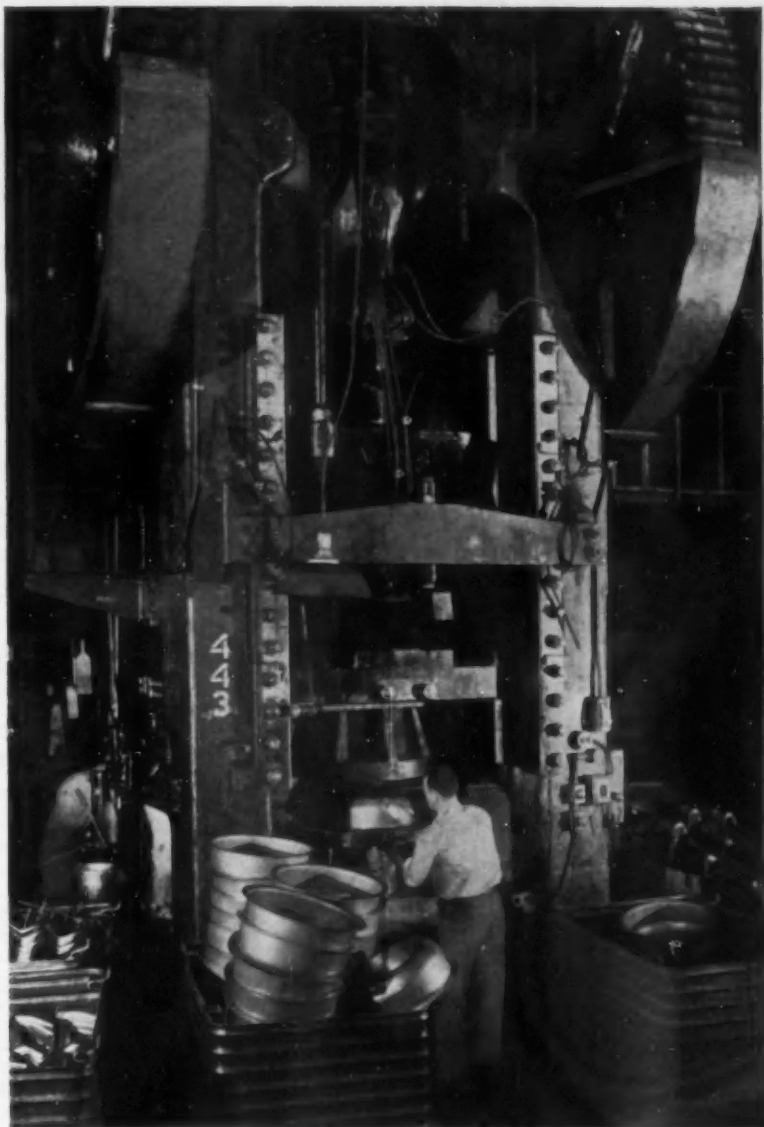
COOLIDGE CORPORATION
MIDDLETOWN, OHIO

CALENDAR

OF COMING SHOWS AND MEETINGS

- TTMA Annual Summer Meeting, Sheraton-Cadillac Hotel, Detroit, Mich. July 21-22
- IAS Conference on Turbine Powered Air Transportation, Olympic Hotel, Seattle, Wash. Aug. 8-10
- Air Force Association, annual convention, Mark Hopkins Hotel, San Francisco, Calif. Aug. 10-14
- SAE Golden Anniversary West Coast Meeting, Hotel Multnomah, Portland, Ore. Aug. 15-17
- NICB Symposium on Electronics and Automatic Production, San Francisco, Calif. Aug. 22-23
- Western Electronic Show and Convention, Civic Auditorium and Fairmont Hotel, San Francisco, Calif. Aug. 24-26
- International Ignition Conference, Scintilla Div., Bendix Aviation Corp., Sidney, N. Y. Aug. 24-26
- General Motors Powerama, South Lake Shore Drive, Chicago, Ill. Aug. 21-Sept. 25
- National Aircraft Show, International Airport, Phila., Pa. Sept. 3-5
- AMTDA Annual Meeting, Blackstone Hotel, Chicago, Ill. Sept. 5-6
- Farnborough Air Show, England Sept. 5-11
- Paris Automobile Show, France Sept. 6-16
- NMTBA Machine Tool Show, International Amphitheater, Chicago, Ill. Sept. 6-17
- Production Engineering Show, Navy Pier, Chicago, Ill. Sept. 6-17
- Coliseum Machinery Show, Chicago, Ill. Sept. 6-17
- SAE Golden Anniversary Tractor Meeting and Production Forum, Hotel Schroeder, Milwaukee, Wis. Sept. 12-15
- Instrument Society of America, 10th annual Instrument-Automation Conference and Exhibit, Shrine Exposition Hall and Auditorium, Los Angeles, Calif. Sept. 12-15
- National Petroleum Association, annual meeting, Traymore Hotel, Atlantic City, N. J. Sept. 14-16
- National Industrial Packaging and Materials Handling Show, Kingsbridge Armory, New York, N. Y. Sept. 20-22
- First Trade Fair of the Atomic Industry, Sheraton-Park Hotel, Washington, D. C. Sept. 26-29
- AIEE Fall General Meeting, Hotel Morrison, Chicago, Ill. Oct. 3-7
- World Plastics Fair and Trade Exposition, National Guard Armory, Los Angeles, Calif. Oct. 5-9
- SAE Golden Anniversary Aeronautic Meeting, Production Forum, and Engineering Display, Hotel Statler, Los Angeles, Calif. Oct. 11-15
- National Metal Exposition, Convention Hall, Philadelphia, Pa. Oct. 17-21
- International Motor Show, Earls Court, London, England Oct. 19-29
- Canadian Industrial Tool and Equipment Show, Montreal, Canada Oct. 24-28
- ASME-IME Joint Conference on Combustion, London, England Oct. 25-27
- Automobile Old Timers, 16th anniversary dinner, Waldorf-Astoria Hotel, New York, N. Y. Oct. 28
- SAE Golden Anniversary National Transportation Meeting, Hotel Chase, St. Louis, Mo. Oct. 31-Nov. 2

engineered
stamping
expert
at work!



Here you will find technicians skilled in every production facility: deep drawing, shearing, spot welding, arc welding, brazing, pressing, degreasing, painting. All with years of experience and production knowledge. Why not put this same production team to work for *you*? For full details on our services, call, wire, or write!

ACKERMANN MANUFACTURING COMPANY
WHEELING, WEST VIRGINIA

Steel Stamping does it BETTER—Ackermann-Wheeling does it BEST!

Automatic Machines For Farm Tractor Transmissions

(Continued from page 55)

the largest Michigan Tool Shear Speed machines found in the automotive field. They are shaved in the green, then preheated in a gas-fired furnace and presented to the Wel-tronic unit for tooth hardening.

The output gear, one of the gears that carries maximum loading, requires some special processing. It is

given an initial carburizing treatment after gear tooth cutting to develop a case depth of 0.060 in., then is shaved and induction hardened.

The ram arm, a casting used on the hydraulic lift mechanism, has a large ball end cavity that requires hardening. This operation is performed in one of the new Lindberg induction

heating machines, fitted with a conveyor for returning parts from the quench bath. It is a two-station machine, used for other parts as well.

A battery of seven, vertical type Tocco hardening units is employed for hardening axle shafts.

Since gear quality is so important in this operation, all gears in the green are inspected individually, then routed for testing to an area in which there is a row of 16 sound booths, each one equipped with a Red Ring gear speeder.

Although all gears are inspected and sound-tested individually, the quality of the complete transmission assembly is checked before the units are accepted for the final assembly line. The procedure is quite ingenious. The last section of the transmission assembly conveyor is arranged to move through a large inspection booth having four test stands, two for four-speed transmissions, two for five-speed. As the transmissions enter the booth, they are lifted off by hoist and installed in the test machine where they are loaded and tested for noise, for functional operation, for PTO operation. Accepted units are returned to the conveyor for transport to the unloading station outside the booth.

Noteworthy too is an installation of a battery of New Britain "GF" tracer controlled lathes in the transmission department. The general features of these machines are familiar to our readers. They employ a single tool, controlled by an externally mounted master pattern. Ford has found them to be invaluable in the machining of shafts that require considerable formations. At the same time these lathes have an extremely rapid cycle, making it possible to finish intricately formed shafts directly from the rough in a completely automatic cycle. Another desirable feature of these lathes is their flexibility, making it a simple matter to change over from one type of job to another simply by changing the master pattern.

This is the second in a series of three articles by the author, devoted to Ford's Highland Park plant. The third part will appear in an early issue.

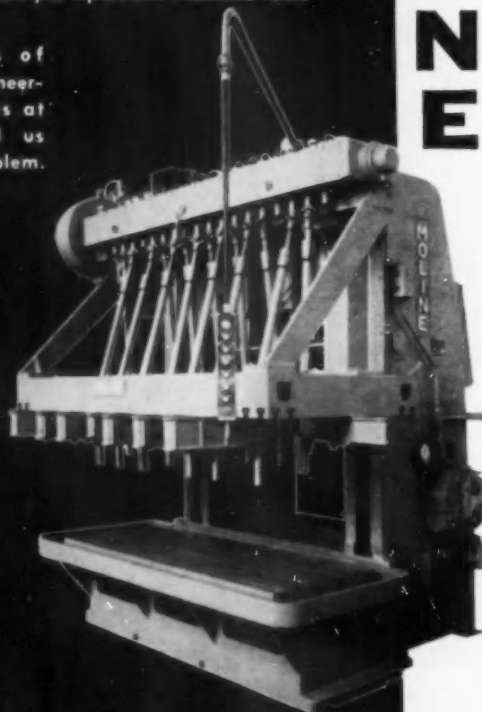
FOR GREATER . . . PRODUCTION • EFFICIENCY • SAVINGS

Use an individually designed "Hole-Hog" Machine Tool for such jobs as:

- Multi-Spindle Boring
- Single and Multi-Spindle Honing
- Straight Line Multi-Drilling
- Adjustable Spindle Drilling
- Vertical and Way-Type Fixed Center Drilling, Boring and Tapping
- Special Multiple Operation Machine Tools

Over 50 years of Machine Tool Engineering experience is at your service. Tell us your particular problem.

HU68 drilling machine with fourteen spindles adjustable in a 72 inch by 24 inch drilling area. Other sizes available.



Representatives in principal cities.

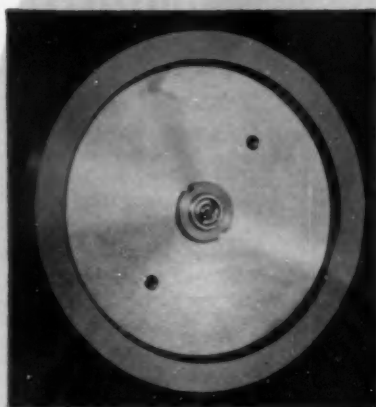
MOLINE TOOL COMPANY
100 20TH STREET MOLINE, ILLINOIS

MOLINE

AUTOMOTIVE INDUSTRIES . . .

is your News Magazine of
Automotive and Aviation

MANUFACTURING



100% more pieces per grind
300% less tools required per job
400% savings in monthly tool cost

the superiority of
ELOX electrical
 discharge
 grinding was
 proved by this
 large automotive
 company's**
 unsolicited 2-month
 comparison report!

Tool Name, Description:	Solid Carbide Insert	
Part Name:	Crankshaft	
Operation Name:	Finish Front & Rear Thrust Bearings	
	Standard Grind	Elox EDM Grind
TOTAL PIECES PER TOOL	17,290	95,904
MINUTES PER GRIND	21.0	13.75
COST PER GRIND	\$ 1.26	\$.83
ESTIMATED MONTHLY TOOL COST	\$294.71	\$92.19

in writing

Elox will guarantee increased tool productivity over any type of abrasive grinding.

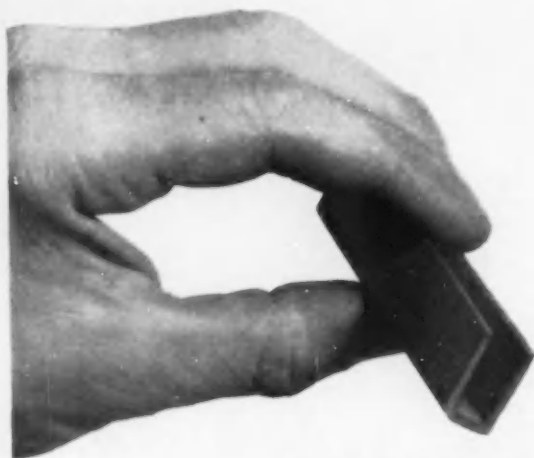
Other Elox equipment available to remove broken taps, drills, etc., from \$495 to \$3450.

elox corporation of michigan

727 north rochester road • clawson, michigan

**Comprehensive report and company name given on request.

*T. M. Reg.



FROM **WINDOW GUIDES**

TO **INSULATION**



FELT

by **FELTERS**

DOES THE JOB RIGHT

For a good slip-fit without rattling or looseness, Felters Felt is an ideal design material. To insulate against heat or cold, there are grades of Felters Felt to solve many knotty problems.

If you would like information about felt's versatility in solving design problems, write to Felters.

Our 16-page "Felt Design Book" describes many interesting problems that have been successfully solved by Felters Felt. Write for your free copy. THE FELTERS CO., 253 South St., Boston 11, Mass.

FELTERS S.A.E. FELTS F-10, F-11 & F-13

are often used for oil or grease retention where the felt is compressed or confined in an assembly. Where operating conditions are not too severe, these grades are also used to make dust shields.

These are 3 of many grades of Felters Felt produced for specific applications.

FELTERS FELT

... by the roll ... by the yard
... or cut exactly as you want it



More than one-third of all automotive fatalities last year were caused by drivers exceeding established speed limits.

A good driver can get as good mileage at 60 mph in a new car as he could have obtained at 40 mph 10 years ago.

Last year, civil aircraft sprayed over 5.2 million gal of chemicals and spread over 32.4 million lb of dust over five million agricultural acres in Oregon, Montana, Washington and Idaho.

A new portable aircraft starter, developed by a West Coast aircraft manufacturer, improves the combat efficiency of a plane by cutting a quarter-ton off its weight.

A mechanized assembly line, with 22 separate stations, cuts final assembly time on a new jet training plane by approximately 25 hr.

Insurance premiums paid by motor vehicle owners now exceed \$3.6 billion annually.

The retail price of the average \$2000 car includes \$555 in Federal, state and local taxes.

The Federal Government now operates at least 100 businesses and has invested some \$40 billion in them.

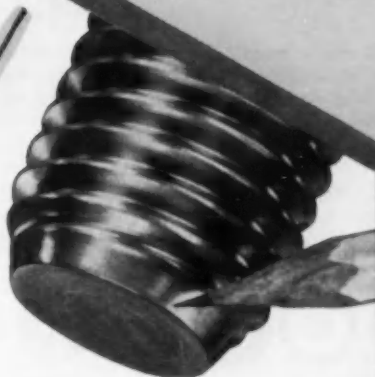
One modern bomber carries 6000 lb of complex electronic equipment, compared to just 1600 lb of the same type of equipment carried by its World War II counterpart.

Each swept-back wing of one of this nation's latest jet bombers contains 14,698 bolts and rivets.

U. S. farmers own nearly seven million cars and trucks.

NOW

The Leader in Stainless Socket Cap Screws OFFERS YOU THE LEADER POINT



Allen's unthreaded Leader Point permits easier starting, reduces the possibility of cross threading, protects threads from damage if the screw is accidentally knocked or dropped. Your Allen Distributor stocks the largest range of sizes in 18-8 stainless cap screws available anywhere . . . 97 standard sizes #4 x $\frac{1}{4}$ " to $\frac{5}{8}$ " x 3" with NC threads; #10 x $\frac{3}{8}$ " to $\frac{3}{8}$ " x $1\frac{1}{2}$ " with NF. Be sure to specify genuine Allen Leader Points.

Also standard with Grip Heads in popular sizes.

ALLEN

MANUFACTURING COMPANY
Hartford 2, Connecticut, U.S.A.



STAINLESS SET SCREWS

With the improved Allenpoint,
available from your distribu-
tor in 54 standard sizes
#4 x $\frac{1}{8}$ " to $\frac{1}{2}$ " x 1"
NC and #10 in lengths
from $\frac{3}{16}$ " to $\frac{3}{4}$ " NF.

Sold only through leading Industrial Distributors.

Mechanized Line for Automatic Inspection of Parts

(Continued from page 63)

tinuous variable speed conveyor running its full length through the processing, inspection, and demagnetization stations. An outstanding feature of the equipment is its flexibility since it is capable of handling forgings of different lengths and weights without changing fixturing. Both headstock and tailstock contacts — for

magnetization — have handwheel adjustments to allow for parts of varying lengths. Handwheel adjustments are made initially to accommodate handling of different forgings in established lots. Clamping action is effected by air cylinders, this action being initiated by means of a foot switch.

In operation, the attendant places the forging between the headstock and tailstock, clamping by means of the foot switch, thus initiating circular magnetization. The part then is unclamped and laid longitudinally on the conveyor for transport through the automatic magnetic particle spray station, then into the inspection booth. Upon leaving the first enclosed booth, the part enters another magnetizing station for longitudinal magnetization, followed by another spray of fluid containing magnetic particles, and inspection.

By using both circular and longitudinal magnetization, as well as two inspectors, the forging is completely explored in all planes and the risk of accepting flaws is virtually eliminated.

As the parts leave the second inspection booth, they pass through a demagnetizing coil, then drop onto a cross conveyor belt which carries them into a suitable container for transportation to the machine shops.

The Magnaglo machine is capable of inspecting at the rate of 600 pieces an hour with three operators — one for loading, two for inspecting.

The Magnaglo bath is contained in a tank beneath the conveyor, agitated and recirculated by two impeller type pumps. A motor-driven Cuno filter is installed in the pump circuit to keep the bath free from contamination. The bath is sprayed automatically from fixed nozzle stations.

As mentioned earlier, the unit is equipped with two, fire resistant, curtain enclosed booths, each one having six, near-ultraviolet "black" lights. Each one also contains a 16-in. ventilating fan and two white lights.

The variable speed conveyor makes it possible to operate the unit within a wide range of operating speeds, depending upon the number of operators employed, as well as the desired rate of inspection. The Packard unit is arranged at present to inspect 600 forgings an hour.

It may be noted, too, that the forgings are given a pickle treatment as well as tumbling to prepare the surface for inspection as well as subsequent machining operations.

ROCKFORD



POSITIVE ENGAGEMENT

EASY OPERATION

HIGH TORQUE

POSITIVE ENGAGEMENT

LARGE DRIVING AREA

SMOOTH RUNNING

INFREQUENT ADJUSTMENT

MINIMUM INERTIA

* ROCKFORD Over-Center CLUTCHES remain in or out of engagement until changed by the operator. The smooth, easy, anti-friction engagement — obtained by roller cams pressing against the pressure plate face — progresses from "release" to "on center" to slightly "over center" where the clutch locks in engaged or running position.

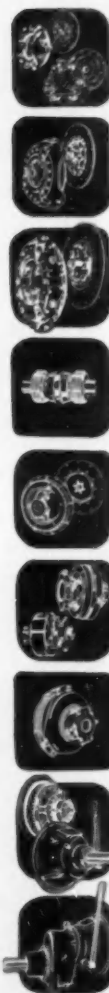
Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.



ROCKFORD CLUTCH DIVISION BORG-WARNER
A 315 Catherine Street, Rockford, Illinois, U.S.A. A

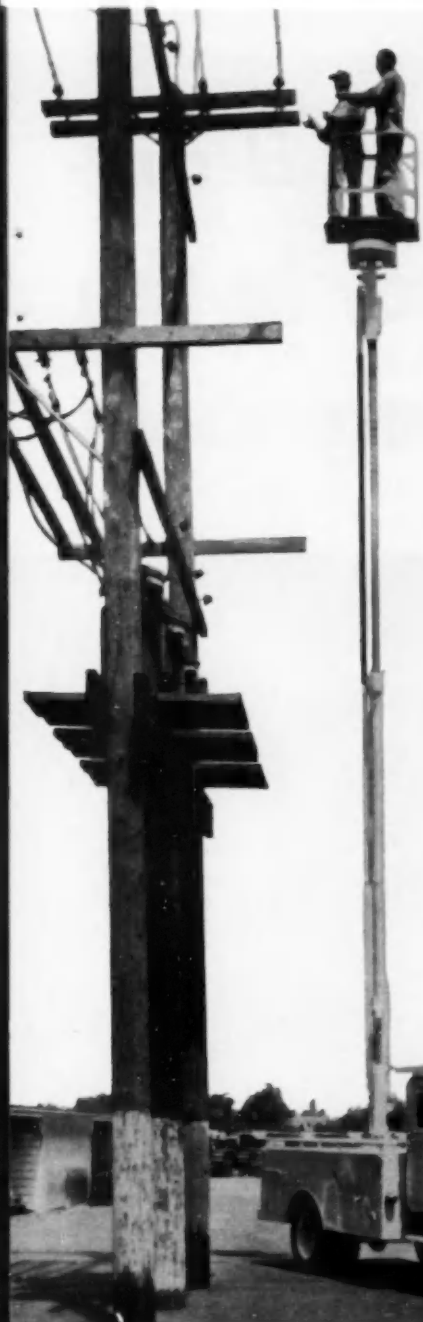
CLUTCHES



AUTOMOTIVE INDUSTRIES . . .

is your News Magazine of
Automotive and Aviation

MANUFACTURING



Industrial Monkey Gets a "Lift" from SHELBY SEAMLESS TUBING

The versatile Industrial Monkey* is ideal for all types of high work operations including tree-trimming, line work, street light servicing, painting, shipyard work, airplane servicing, and fire fighting.

The basic Industrial Monkey unit consists of a hydraulically-operated telescoping boom with a self-leveling work platform. The boom, mounted on a base, swings in a 270 degree arc and operates from the horizontal to vertical at a working height of 50 feet. All movements are electrically controlled, either from the work platform or from dual controls in the truck upon which the unit is mounted.

*Manufacturer's name on request.

The agile swinging boom is comprised of an inner and outer member—both of Shelby Seamless Mechanical Tubing. Shelby Seamless is just the ticket for applications like this, for it offers the high strength, uniformity, dimensional accuracy, and dependability that only *seamless* can give. It is available in a complete range of diameters, wall thicknesses, and steel analyses to meet exacting requirements.

If you feel you'd like further information on applying Shelby Seamless Mechanical Tubing to your product, our engineers are at your disposal. Contact them at any time.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.

(Tubing Specialties)

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS

UNITED STATES STEEL EXPORT COMPANY, NEW YORK



Shelby Seamless Mechanical Tubing

SEE THE UNITED STATES STEEL HOUR. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

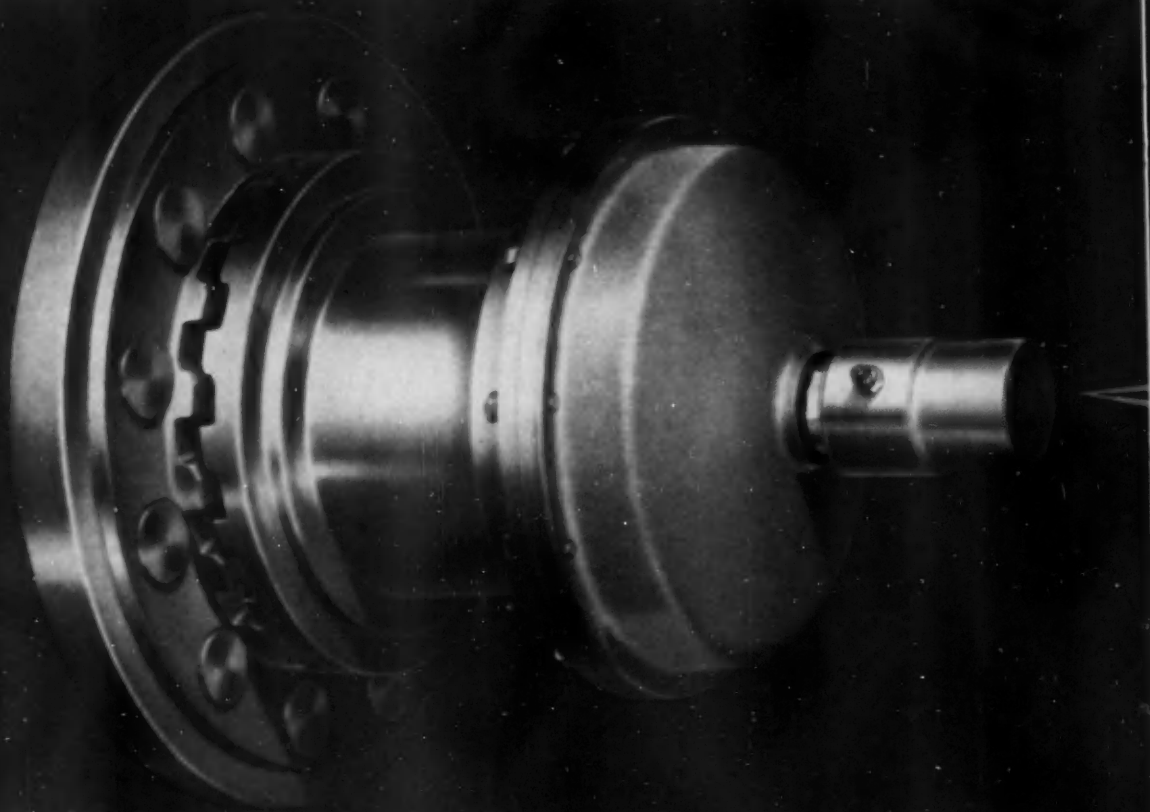
All Shelby Seamless Tubing is pierced from solid billets of uniform steel. This is the one manufacturing method that assures absolute uniform wall strength.



UNITED STATES STEEL

Exclusive **NIAGARA** **Electro-**

A prime factor in the operating economy



- Examine it. See it operate. Try it yourself. Compare it point for point. The Niagara Electro-Pneumatic Clutch is distinctly superior in every respect: hourly output ... ruggedness ... simplicity ... safety ... savings in operation and maintenance. *It's functionally different in every major detail!*

There, in a nutshell, you have one of the principal reasons why Niagara presses continually out-perform all others. For fact-loaded details, as applied to single or double crank inclinable, gap frame, horn and deep throat presses, request specific literature and consult with a Niagara representative.

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

DISTRICT OFFICES:

Buffalo • Cleveland • Detroit • New York • Philadelphia
Dealers in principal U. S. cities and major foreign countries

Pneumatic Clutch

greater output, safety and of Niagara Presses

For Better Performance and Safety

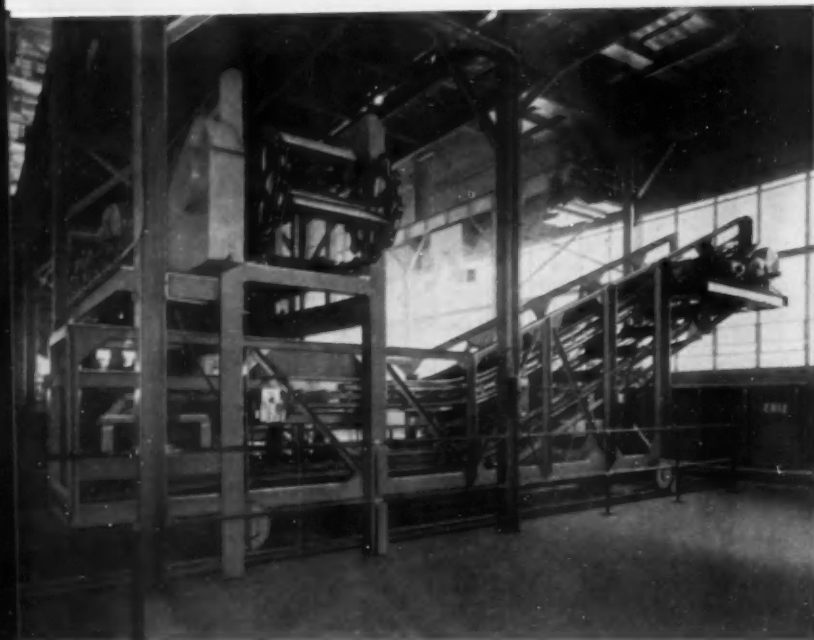
- ENGAGES AND DISENGAGES INSTANTLY at any point in the stroke.
- CAN BE SINGLE-STROKED, JOGGED (forward and in reverse) or operated continuously.
- STOPS INSTANTLY by push button, electric eye, limit switch or similar devices — regardless of crank position.
- PROVIDES EFFORTLESS PRESS OPERATION by palm buttons or foot switch.
- FAILS SAFE. Press stops automatically if electric current or air pressure fails.

For Less Maintenance

- NO FRICTION SURFACES to slip, heat up and wear.
- SIMPLE, COMPACT DESIGN. Nothing to adjust.
- LOW INERTIA. Small in diameter. Operates directly on crankshaft, the slowest rotating shaft. No gears nor high speed shafts, etc. to start and stop
- LENGTHENS GEAR LIFE. Wear is distributed uniformly, because engagement load is not always applied to same teeth.
- RUNS IN SEALED BATH OF OIL to minimize wear.
- EASILY ACCESSIBLE. Mounted at end of shaft, external to flywheel.
- NO BUCKING of clutch vs. brake.



America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work



Saves \$22,000 a year

Planet Pusher-Bar Conveyor Pays for Itself in Eleven Months

At a leading automobile plant, loading scrap from trim presses on to railroad cars formerly required a two-man crane and magnet operation.

Now . . . two Planet conveyors move baled scrap to waiting railroad cars *automatically* . . . saving \$22,000 a year!

The system, which now loads an average of 12 cars a day, is engineered to handle a maximum of 105 cars a day. The retractable conveyor permits easy movement of the railroad cars.

If your plant has a scrap handling problem, get in touch with a Planet Engineer. Whatever your plant layout, he'll show you an efficient, compact, and economical way to minimize your handling costs.

PLANET CORPORATION

1822 SUNSET AVENUE
LANSING, MICHIGAN



- CONVEYORS
- ENGINEERED SYSTEMS
- FOUNDRY EQUIPMENT
- AUTOMATION
- STEEL FABRICATION

Electrostatic Spray Painting of Automobile Chassis

(Continued from page 61)

in a position which is upside-down.

Five 6-in. diameter atomizing bells are used. Two, at 45 deg angles, are positioned, one on either side of the line, near the front of the electro-spray booth. Another is directly below the conveyor, underneath the chassis, and two are located overhead near the exit of the booth.

Three micro switches on each side of the conveyor—just outside the electro-spray area—are timed to turn on and off the three pump units located outside the booth. The quick drying paint, with asphalt-type base, flows to the bells, or atomizers, only when chassis are in position for painting. The first switch on one side of the line starts one pump which supplies paint to the side atomizers as the chassis enters the electro-spray area. A second starts the pump feeding the middle atomizer, and the third controls the pumps feeding the two overhead atomizing bells. Switches on the opposite side of the conveyor are positioned to turn off the pumps after a chassis is coated, and before another enters the paint area.

With the Ransburg equipment, a voltage pack is connected to the paint sprayer, creating an electrostatic field between it and the articles to be painted. The pump units supply paint through the hollow drive shaft of the atomizer as needed, and rapid rotation feeds the paint at a uniform rate through the bell-shaped atomizer to its outer edge. Atomization occurs under the influence of the electrostatic field, producing a spray pattern of electrically charged particles. The attraction of the field pulls the spray to the moving articles which are grounded electrically by their hangers. All of the spray is deposited.

Nearly 100 sq ft of floor space was made available, for under the old-setup approximately 1200 sq ft were required to do the painting job which is handled more efficiently now in 200.

AUTOMOTIVE INDUSTRIES . . .

Is your News Magazine of
Automotive and Aviation
MANUFACTURING

moraine engineering



...where problems inspire progress

Every engineer has watched a good idea thrown away because of seemingly insurmountable production problems. But that is something that seldom happens at Moraine.

If everyday methods won't solve a problem, Moraine engineers approach it from different directions, or try whole new methods, until the solution is reached. Continuing progress by design and process engineers has made Moraine a dependable, farsighted supplier to the automotive and other industries.

There are many ways to illustrate the basic

Moraine philosophy . . . that success is assured to those whose experience and forward thinking help customers to anticipate their needs. One is pictured above: A new, greatly improved band assembly for the 1955 model of the biggest-production automatic transmission.

Other Moraine products include: Moraine-400 bearings, toughest automotive engine bearings ever made—M-100 engine bearings and Moraine conventional engine bearings—self-lubricating bearings—Moraine friction materials—Moraine metal powder parts—Moraine porous metal parts—Moraine power brakes—Delco hydraulic brake fluids—Delco brake assemblies, master cylinders, wheel cylinders and parts.



**moraine
products**

DIVISION OF GENERAL MOTORS, DAYTON, OHIO

AIRBRIEFS

(Continued from page 102)

carried out and promoted Business Flight Safety. The National Business Aircraft Association of Washington, D. C., will administer the award. The first award will be presented at the Eighth Annual Meeting and Forum of the National Business Aircraft Association to be held in Detroit, Mich., October 5-7, 1955.

Airlines Win Awards

The National Safety Council's award was won by 39 scheduled U. S. airlines for going through 1954 without a crew or passenger fatality. Earl D. Johnson, president of the Air Transport Association, in presenting the awards to the 39 airlines, said, "In the scheduled airlines industry safety almost comes before any other consideration. The awards are a fitting tribute to every man and woman responsible for scheduled airline operations—the aircraft design-

ers and builders, airline management and airlines' ground personnel and flight crews." Mr. Johnson further stated, "The 1954 safety record (only 0.09 fatalities per 100 million passenger miles) is a 77½ per cent improvement over 1952 which previously held the record with a 0.4 fatality rate."

Glass Airplanes

Glass fiber reinforced plastic is being used by a light plane manufacturer in the construction of airplane seats, doors, fuel tanks, wheel pants, cowl instrument panels. Use of a strong light-weight plastic, according to the manufacturer, increases speed by about 12 mph. It is predicted that glass airplanes may be soon flying the airlines.

Air Cargo

Interesting activities are taking place these days in the air cargo business. Germany, for example, has been quick to take advantage of air transportation to recapture some of its world market. One of their industries is shipping curtain rings by air to a majority of retail outlets.

Air delivery of parts, equipment, medicine, food and other supplies has saved millions of dollars and countless lives because of the speed and economy of air transportation. One of the world's largest construction companies, employing 400 men on a tunnel construction in Venezuela, was faced with a \$10,000 per day loss when a chain broke on one of its huge machines. A replacement part was required from Denver, Colorado. By surface transportation, the 300 lb chain could be obtained in two weeks for shipment cost of \$34.00. The chain was shipped by air at the cost of \$130.40 and it saved the construction company about \$100,000 in workmen's time.

This incident is typical of what has become routine in the air cargo industry and gives one an idea of the tremendous economic impact that it has in countries all over the world.

Wired by Air

A Pacific telephone company literally "took to the air" recently when it was faced with the task of stringing two miles of telephone wire across rugged hilly country. After spotting the poles on the hilltops the company was faced with weeks of laborious work stringing wire through the treacherous country by hand. Instead they hired a helicopter which did the job in one hour's time.

(Turn to page 143, please)

Here's the integral drive square ...



... Introduced by S.S. White 28 years ago and still the standard for speedometer cable!

The integral drive square is formed by swaging the end of a flexible shaft speedometer cable into an accurate square. It provides a driving end which needs no machined end fittings. It makes the use of a small diameter casing practical, thus reducing the cost of the entire speedometer drive combination. It also eliminates 90% of the cost of machined end fittings as well as the uncertainty of whether the end fitting is properly attached.

Introduced by S.S. WHITE in 1927, the integral drive square is now standard for all speedometer cables. Over the years, the savings that have accrued from this development have been tremendous. During the last 50 years the many developments in speedometer cable design and manufacturing originated by S.S. WHITE have brought about outstanding improvements in speedometer cable economy, performance and dependability. That's why it will pay you as an automotive engineer to specify S.S. WHITE CABLE from your speedometer supplier.

S.S. WHITE "FIRSTS"

have meant better, more economical speedometer cable

FIRST to pioneer the use of flexible wire wound cable.

FIRST to introduce automation in speedometer cable manufacturing.

FIRST to develop machines for arc-welding speedometer cables.

FIRST to introduce integral drive squares.

FIRST to develop satisfactory swaging equipment for speedometer cable.

FIRST to develop small diameter, thin wall speedometer casing.

FIRST to introduce galvanized casings for speedometer service.

S.S. WHITE INDUSTRIAL DIVISION 10 East 40th Street, New York 16, N. Y.

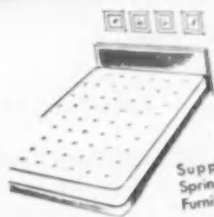
S.S. White

FIRST NAME

IN FLEXIBLE SHAFTS

S.O.S

Symbol of Service
for 48 years...



Supplier of Inner Coil Spring Units to Mattress and Furniture Manufacturers.



Supplier of Interior Metal Trims and Spring Seating Units to the Automotive Industry.



Supplier of Brake, Clutch, Valve, and Other Mechanical Springs to the Automotive and Other Industries.



Supplier of Fuselages and Ammunition Components to the Armed Services.



Supplier of "Star Service" All Wire and "Paper-Strut" Garment Hangers to Cleaners and Dyers.



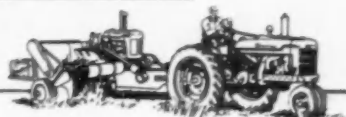
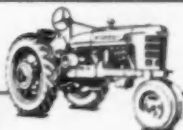
Supplier of Racks and Shelves to the Refrigerator and Stove Manufacturers.

L. A. YOUNG SPRING & WIRE CORPORATION

GENERAL OFFICES: Detroit 11, Michigan

IN CANADA: L. A. YOUNG INDUSTRIES, Ltd., Windsor, Ont.

they had to be certain...



**So INTERNATIONAL HARVESTER
chose RICHARDSON
to mold this plastic
distributor cap**

When a manufacturer like International Harvester uses a part for all the tractors, power units, and implements it produces—the figure runs into hundreds of thousands a year. And because each part has to conform to rigid I-H engineering specifications—it has to be *right*, too!

Obviously, I-H must turn to a plastics molder who has facilities for large-scale production and who can offer precision molding skill and the assurance of uniform quality combined with delivery as scheduled.

And that's why Richardson was selected to mold this plastic distributor cap.

For a quarter century, Richardson has been handling the "tough ones" for International Harvester. Why not turn to Richardson when you have a tough plastics job?

INSUOK®



MOLDED & LAMINATED PLASTICS

The RICHARDSON COMPANY

FOUNDED 1898—LOCKLAND, OHIO

2678 Lake Street, Melrose Park, Illinois (Chicago District)

SALES OFFICES IN PRINCIPAL CITIES



MELROSE PARK, ILL.



TYLER, TEX.



INDIANAPOLIS, IND.



NEWNAN, GA.



NEW BRUNSWICK, N. J.



OGDEN, UTAH

AIRBRIEFS

(Continued from page 140)

French Four-Place Twin-Jet

The American premiere showing of the French designed Morane Saulnier, 760 commercial twin-jet airplane, was recently made at the West Chester County Airport, N. Y. Sponsored by the Beech Aircraft Corp., this commercial jet plane will be shown and demonstrated throughout the country to obtain a market evaluation. Should enough purchaser interest be indicated it is likely that Beechcraft will make the plane available for the United States market.

Air Navigation Manual For Army Aviation

The United States Army has officially adopted the Jeppesen Airway Manual, designated TM 11-2557, as its standard air navigation chart service. The manual, comprising three volumes, includes in Volume I complete navigation charts, planning charts, radio direction finding facilities, also airport range facilities, meteorological data, standard broadcast station listings, airport directory section, standard patterns for air traffic control, airway traffic control procedures, civil air regulations, all necessary legends, and radar weather vectoring and advisory services.

Volumes II and III are complete with area charts, radio procedure charts and instrument approach and let-down charts for both civil and military. Included with the manuals is a weekly revision service which will be made to each pilot individually.

Canadian International Air Show

The Air Show, held in Toronto, Canada, early in June, 1955, in connection with Canadian International Trade Fair, was a very interesting and well planned event. Canadian and American aircraft as well as a Czechoslovakian plane participated in the 20-event show. The show was opened by a fly-pass of 16 F-86 Canadian-built Sabre Jets, 16 CF-100 all-weather interception sea fighters and 16 T-33 Silver Star trainers. All flight demonstrations were made over Lake Ontario, just off the shore of the Canadian National Exhibition Grounds. It was a great relief to



Engineer Wallace Feemster and Press Foreman Sherwood Henderson watch as 600-ton Warco Eccentric Gear Press performs five stamping and drawing operations in manufacture of refrigerator motor housing.

**"Presses That Stand Up Plus
A Desire to Serve After Sale
Is Why I Choose WARCO..."**

**Says Chief
Engineer of
One of
America's
Foremost
Stamping
Firms**

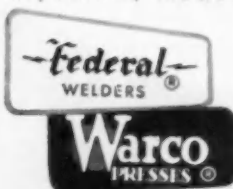
"When it comes to quality, the Warco Press is one of the finest, and we like the way Warco engineers stay with the sale until everything is satisfactory," say engineers of the Bingham-Herebrand Corporation, Toledo, O.

"If for any reason our Warco equipment requires factory service, a phone call brings them on the run," they continue, "and it's this kind of

service that must be considered when buying equipment today."

Bingham-Herebrand is one of the nation's leading custom stamping, forging, and fabricating firms and through the years has used equipment of many makes and is well qualified to make machine comparisons.

If you want quality press equipment backed up by excellent service, add the name Warco to your press supplier list. Representatives in principal cities.



The Federal Machine and Welder Company
Warren, Ohio

SPICER SPECIALIZES

..follow-through on every detail from original "thinking



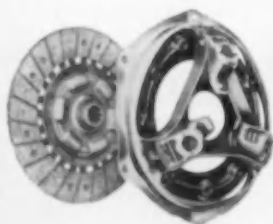
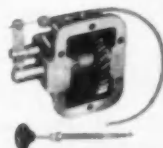
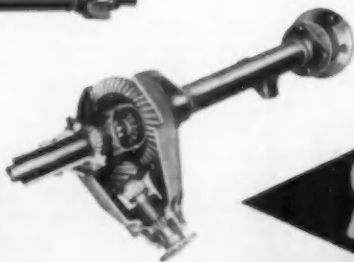
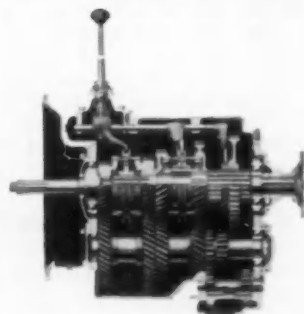
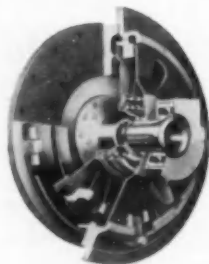
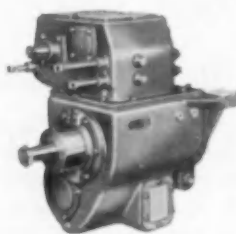
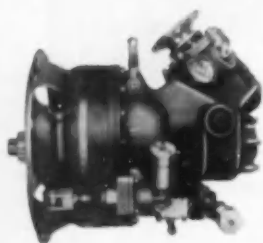
We are there . . . on the job . . . when tomorrow's new car plans and projects are still in the "doodle and discussion" stage.



We are there . . . on the job . . . when the first mechanical layouts illustrate complex power transmission requirements as related to new body, chassis, engine and wheel suspension designs.



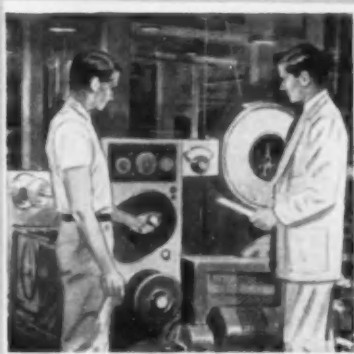
We are there . . . on the job . . . when Spicer product engineers translate car manufacturers' "problems on paper" into factors that can be solved by Spicer know-how and product versatility



DANA

IN FOLLOW-THROUGH

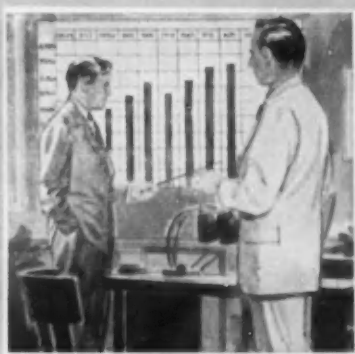
for tomorrow" to prompt delivery of finished product



We are there . . . on the job . . . when new Spicer product developments are tested by the industry's most advanced electronic and mechanical laboratory testing equipment.



We are there . . . on the job . . . when the customer's most punishing road tests check the correctness of Spicer design and manufacture.



We are there . . . on the job . . . with product shipping schedules completely coordinated with the customer's anticipated monthly output.

Spicer service is complete and comprehensive. It creates . . . designs . . . engineers . . . manufactures. And keeps a sharp "follow-through" eye on the progress of each individual job through every step right to customer assembly lines.

Spicer service has been continuous to the automotive industry for over 50 years. Each year sees major power transmission developments which Spicer has created . . . designed . . . engineered . . . and manufactured. These advancements were months and years in their transition to practical use. The new designs we are working on today will be delivered as finished products, one . . . two . . . and three years hence, on schedule, and in keeping with the reputation of Spicer units as "The Standard of the Industry."

No matter what type of automotive vehicle you make . . . no matter what type of power transmission design you need . . . Spicer engineers and Dana resources can serve you well.



CORPORATION • TOLEDO 1, OHIO

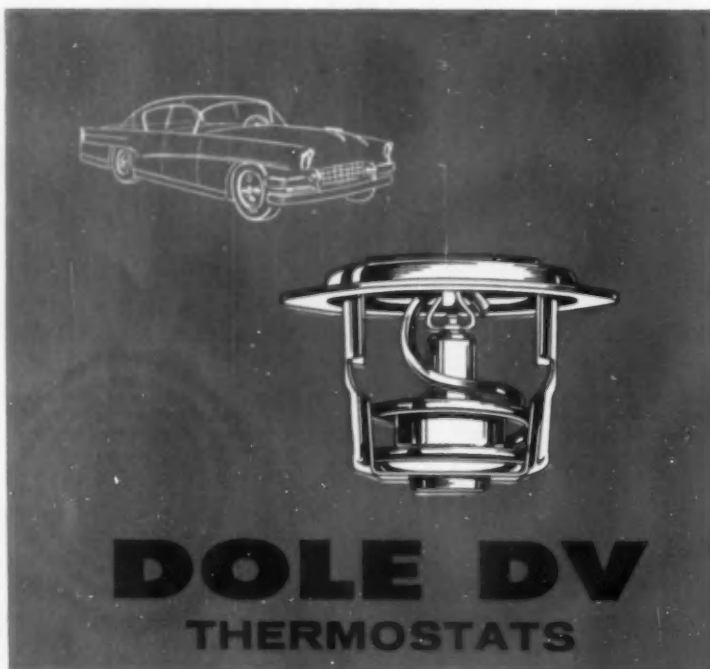
SPICER PRODUCTS: TRANSMISSIONS • UNIVERSAL JOINTS • PROPELLER SHAFTS • AXLES • TORQUE CONVERTERS • GEAR BOXES • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES • STAMPINGS • SPICER and AUBURN CLUTCHES • PARISH FRAMES

witness the show undisturbed by the normal aircraft confusion of planes landing, taking off and taxiing into position. One event followed the other on a split second time schedule and included aerobatic demonstrations of the deHavilland Chipmunk and Beaver, the RCAF Harvard, Otter, a CF-100 and a superb aerobatic performance by the Motorcov (a two-seat military trainer from Czechoslovakia). A spectacular demonstration of jet assist take-off was made by two Canso Amphibian (PB4Y's). United States participation included Naval

Reserve McDonald Banshees from Buffalo; U. S. Navy Marlin Flying Boat; three USAF F-86D's with afterburners; F9F-6 Naval Reserve Cougars and a Bell 47-H helicopter. An air rescue demonstration was made by an RCAF, American-built Piasecki H-21 helicopter.

Shown for the first time in North America was a Bristol Sycamore helicopter. The RCAF also demonstrated its Neptune coastal reconnaissance aircraft. Concluding demonstration was a fly-pass of 48 jet planes.

The Canadian designed and built aircraft represents no small achievement for the Canadian aircraft industry. This industry is stated to be the third largest employer of labor among Canadian industries. During our visit to Toronto, a day was spent at the Canadian International Trade Fair and a very fine impression was had of the exhibits, exhibit technique and the large amount of room available for seeing the exhibits. Although there was considerable participation by U. S. industry we felt that more should have been represented to take advantage of this fine activity.



... for best engine performance

Engineered for modern high-compression engine design to give accurate temperature control with pressurized cooling systems. Speeds warm-up—saves gasoline and oil—reduces engine wear. Gets more heat from the car heater.

Now original equipment on thirty-four (34) leading makes of cars, trucks, tractors, commercial vehicles, industrial and marine engines.

Literature sent on request—please use your letterhead.

Control with Dole
TRADE MARK

DOLE

THE DOLE VALVE COMPANY

1901 W. Carroll Ave., Chicago 12, Ill.

Detroit

Los Angeles

Philadelphia

Taxes Versus Venture Capital

(Continued from page 69)

scramble and high mortality among the small business, and increased governmental regulation of the giants—so extreme as to endanger our democratic way of life.

Another device which weakens free enterprise is excessive governmental regulation of business, attractively packaged as a "planned economy." It is evidenced in the control of prices, in the regulation of production and distribution, in the establishment of subsidies which upsets the free play of markets and creates inefficiency. The "regulators" always start with small plans and small regulations. But, to be effective, regulation aggrandizes itself until it reaches the point where regimentation becomes the rule rather than the exception, reducing competitive forces, smothering initiative and destroying incentives.

From recent speech by Mr. Tector at Angola, Ind.

GM Making Headway On Corrosion Study

General Motors Corp. reports progress on solving salt and rust corrosion problems in automobile bodies. Its researchers are said to have developed several promising steels using less costly alloys than nickel.

Much testing remains to be done, but, if the new steels prove satisfactory, they might be available within a couple of years. An interesting finding by GM is that there are two types of rust—the corrosive kind in damp protected areas (such as inside rocker panels), and the protective type which occurs on exterior surfaces.

Cyclan

RING IRON

Long favorite for Diesels...

Now used in passenger cars!



- Cyclan combines the wearing quality of cast iron with the strength of steel.
- outperforms any ring in the top groove.
- available with or without chrome facing.
- developed by Sealed Power metallurgists and exclusive with Sealed Power.

Among Cyclan's many advantages...

- Cyclan retains the bearing characteristics of cast iron.
- Cyclan has extra high impact value for resisting shock.
- Cyclan rings retain their true shape even after considerable deflection.
- Cyclan rings are especially durable in super-charged engines.
- Cyclan can be readily chrome-plated, but functions efficiently without plating.
- Cyclan is available for original equipment rings in heavy duty engines and passenger cars.
- Some Sealed Power Cyclan Ring Sets are available for replacement use now. Others will follow soon.

Let our engineers tell you the Cyclan story!

SEALED POWER CORPORATION • MUSKEGON, MICHIGAN • ST. JOHNS, MICHIGAN • ROCHESTER, INDIANA
DETROIT OFFICE • 5-164 GENERAL MOTORS BUILDING • PHONE: TRINITY 1-3400

Sealed Power Piston Rings

PISTONS • CYLINDER SLEEVES

Leading Manufacturer of Automotive and Industrial Piston Rings since 1911
Largest Producer of Sealing Rings for Automatic Transmissions • Power Steering Units

"Operations Kingsbury" includes straddle milling two

Front and rear hangers for an automobile front spring assembly are machined on these two Kingsburys. Design of each part requires work from three directions: top, front and back. This work is accomplished in one cycle without rotating the work-holding fixtures.

These two machines illustrate several important advantages, appreciated by design engineers and production men.

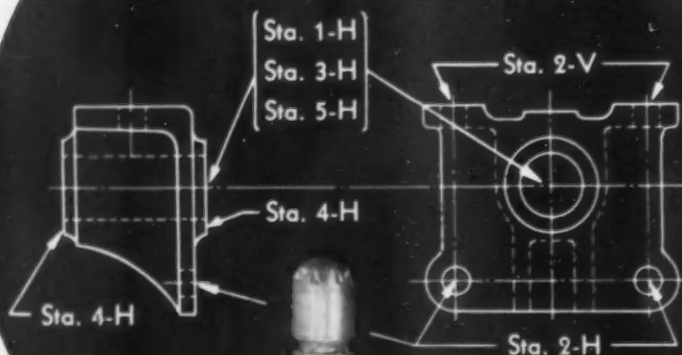
For example: high production at low cost per part. The following table tells this story:

Part	Number of Operations	Parts per hour, gross	Cost per part
REAR HANGER (at right)	10	240	4-6/10c.
FRONT HANGER (at left)	9	265	3-6/10c
REAR HANGER: Two milling operations for only 1c.			

9 Operations - 3⁶/₁₀¢ per part

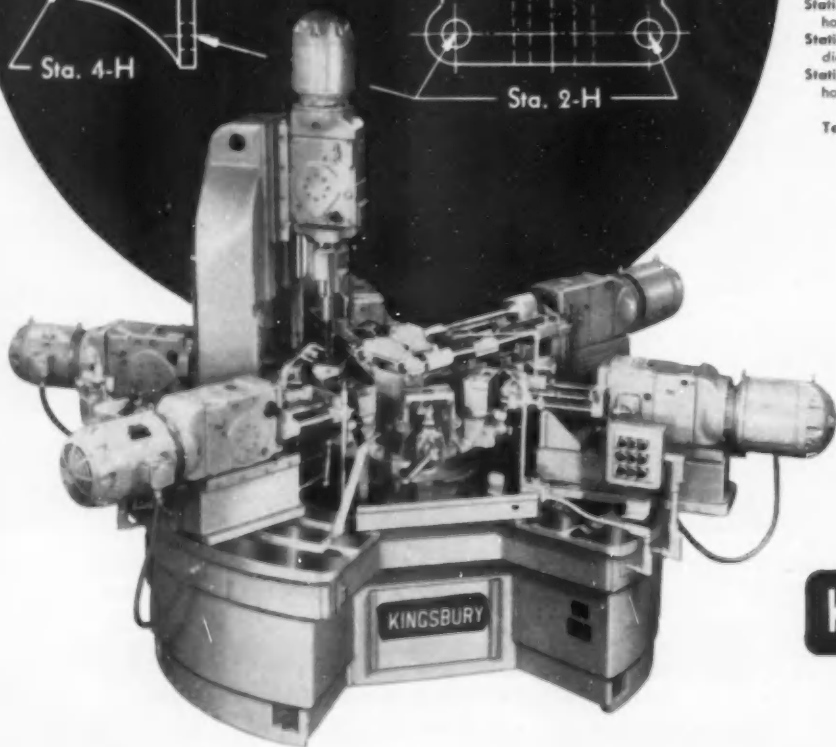
(Malleable Iron)

FRONT SPRING FRONT HANGER



This Kingsbury machine has a 96-inch base and 26-inch index table. Six work units are mounted on the base. Six work-holding fixtures are mounted on the table, which indexes through six stations (one for loading and unloading). All work is performed at five stations, without removing the part from the fixture.

Work	Operations
Station 1-H: Core drill .853/.855 hole undersize	1
Station 2-H: Drill .375 thru — two holes	2
Station 2-V: Drill .375 thru — two holes	2
Station 3-H: Rough ream .853/.855 hole undersize	1
Station 4-H: Spotface bosses 1.25 dia., front and rear	2
Station 5-H: Finish ream .853/.855 hole thru to size	1
Total Operations	9



KINGSBURY

bosses for approximately one cent

There's nothing particularly difficult about any of these operations — until we consider the production output and low cost per part. Even at 80% efficiency, delivery of a finished part such as these *every 19 seconds* or less, is profitable business for the manufacturer.

Today, the design engineer has greater freedom than ever before. He can now design parts with less worry about *manufacturing* operations . . .

because, here at Kingsbury we know what operations a Kingsbury *can* do. So, if we feel that a Kingsbury machine will justify itself in your production schedule, you can plan on high production, low cost per part, and uniform quality.

Kingsbury Machine Tool Corporation
111 Laurel Street
Keene, New Hampshire



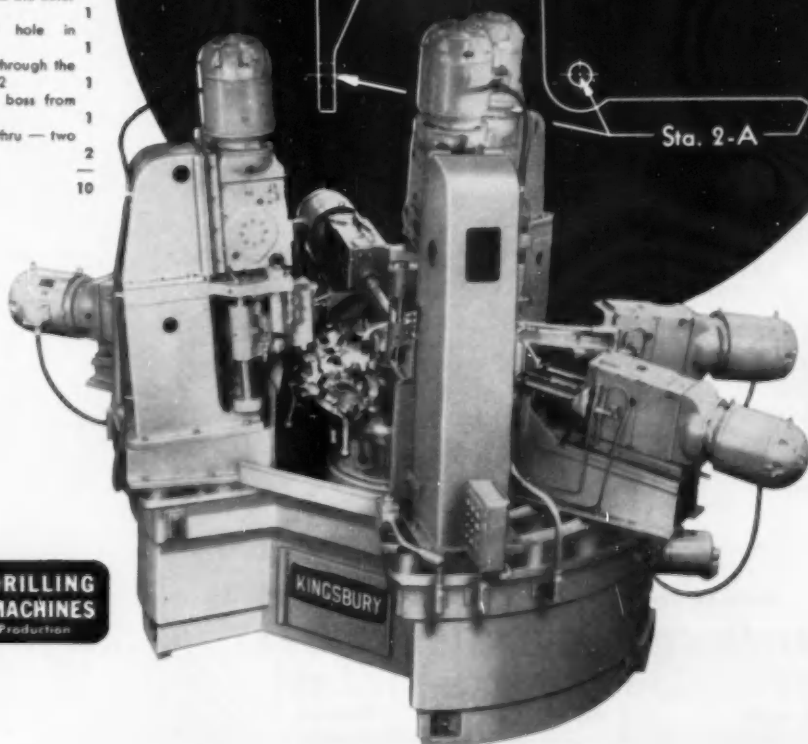
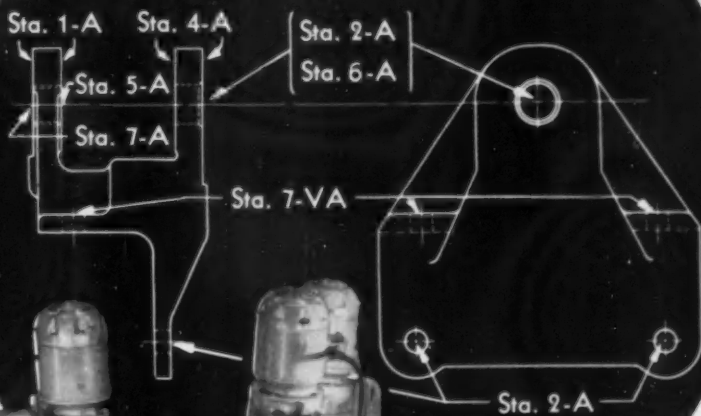
10 Operations - 4⁶/₁₀¢ per part

(Malleable Iron)

The Kingsbury machine also has a 96-inch base, with 30-inch Index Table. Seven work units are mounted on the base. Eight work-holding fixtures are mounted on the table, which indexes through eight stations (one for loading and unloading). All work is performed at seven stations, without removing the part from the fixture.

Work	Operations
Station 1-A: Straddle-mill the outer boss	1
Station 2-A: Drill .656 undersize and countersink 23/32" x 90° one hole in outer boss	1
Drill .375 thru — two holes	2
Station 4-A: Straddle-mill the inner boss	1
Station 5-A: Drill .562 hole in inner boss	1
Station 6-A: Line ream through the two holes, .656 and .562	1
Station 7-A: Tap inner boss from rear: 1/4 — 16 Tap	1
Station 7-VA: Drill .375 thru — two holes	2
Total Operations	10

FRONT SPRING REAR HANGER



**AUTOMATIC DRILLING
AND TAPPING MACHINES**
for Low-Cost High Production



Sealed Power PISTON RINGS

ARE

Thermoil-Granodized with "Thermoil-Granodine"® FOR EXTRA PROTECTION



TF-10
Chrome-faced
Compression
Ring



TF-30
Compression
Ring



RT-20
Oil Control
Ring

Sealed Power Engineered Piston Ring sets feature protective Granoseal Finish, which prevents scuffing and reduces friction 60%, by actual laboratory tests.

Actually, Granoseal Finish is a non-metallic manganese iron crystalline phosphate finish produced by surface conversion of the piston rings in the "Thermoil-Granodine" chemical bath.

Granoseal crystals absorb and retain oil, giving continuous protection during the critical mating or breaking-in period. Granoseal Finish is corrosion-resistant and rustproof. It expedites the normal seating of rings.

Thermoil-Granodizing thus adds thousands of miles to Sealed Power piston ring life and, since it eliminates abnormal wear, scuffing and cylinder scoring, is an invaluable aid to long ring life and satisfaction.



Pioneering Research and Development Since 1914

AMERICAN CHEMICAL PAINT COMPANY
AMBLER, PA.

DETROIT, MICH.

NILES, CALIF.

WINDSOR, ONT.



ON OUR
WASHINGTON WIRE

Competition among companies developing aircraft turbine engines is to be encouraged by the military departments. Multiple-company efforts are to be fostered, and a series of basic engine thrust classes will be established for each category of engine.

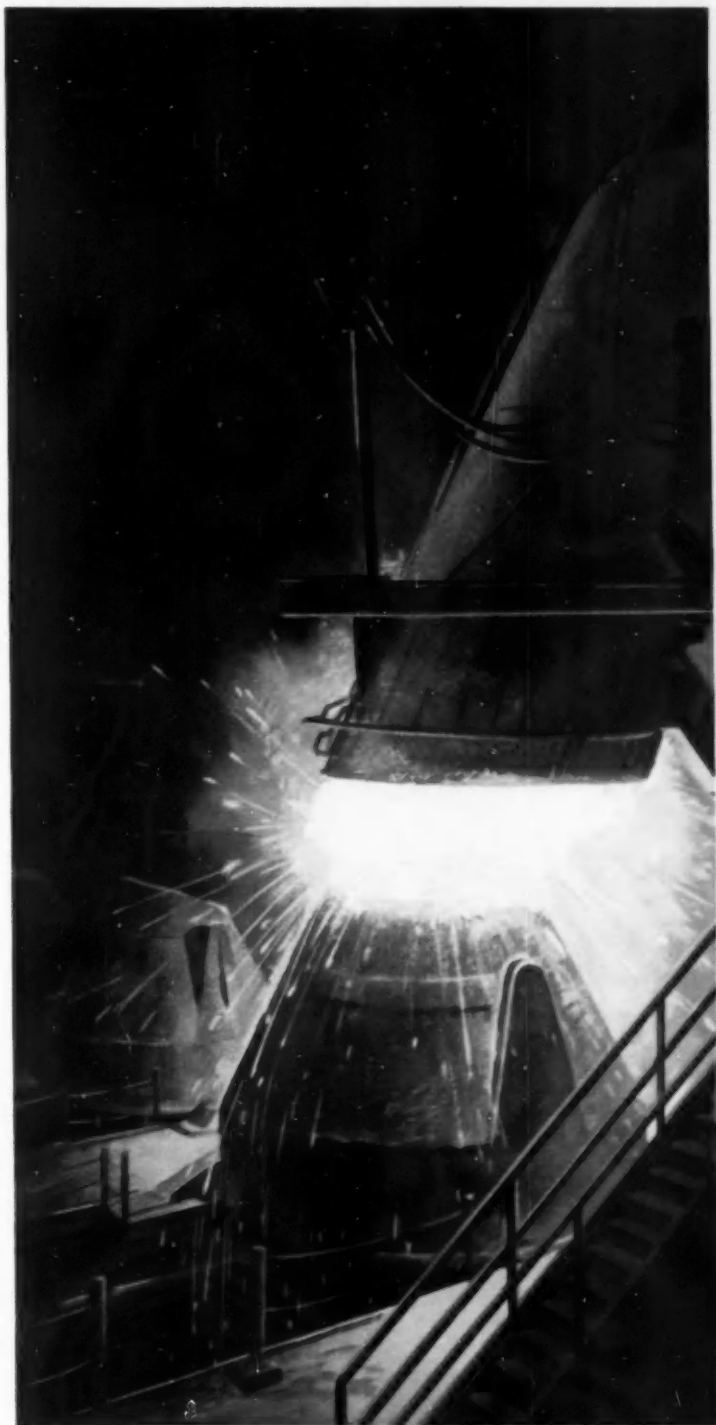
A new Army report (PB 111608), now available to industry, reports on heavy grease as a metal preservative. It may be had by sending \$1.00 to the Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C.

Atomic Energy Commission will soon make available some 180,000 copies of reports on almost 1000 nuclear research subjects of value to industry.

Descriptions of 657 Government-owned inventions of possible use to the metal processes and apparatus, machinery, and transportation equipment industries are now contained in a single booklet (PB 111467). Entitled "Patent Abstract Series No. 4", it is available from Office of Technical Services, U. S. Commerce Dept., Washington 25, D. C. for \$2.00.

Scale models of 3000 trucks will be sent overseas by the U. S. Information Agency to illustrate their role in the average American community. Kits were contributed by American Trucking Associations, Inc.

New developments and continuing needs in the packaging and materials handling fields will be described by industry and military representatives at a Washington conference. Sponsored by the Navy, it will be held from Oct. 10 to 12. Interested parties should get in touch with Chief of Naval Materials, Navy Dept., Washington 25, D. C.



McLouth

HIGH QUALITY

Steel

We are now operating the first Oxygen Steel Process in the United States. This dramatic new method of refining is producing high quality steel with a low nitrogen content.

The advantages of the Oxygen Steel Process are another reason why McLouth high quality sheet and strip steels will serve you better in the product you make today and the product you plan for tomorrow.



McLOUTH STEEL CORPORATION
Detroit, Michigan

MANUFACTURERS OF STAINLESS AND CARBON STEELS



Purolator's "SELECTIVE" FILTRATION leaves additives in

Beneficial additives stay in as HD and heat-resistant lube oils pass through the Micronic® element of a Purolator filter... even though the element is straining out sludge, water and impurities as small as one micron (.000039-inch).

It's one of the reasons why original equipment manufacturers in the automotive field use more Purolators than any other make of filter. Besides this "selective" filtration, the accordion-pleated Micronic® element provides ten times the area of older types, making possible:

- *High flow rates with minimum pressure drop.* Purolators themselves can be small... yet operate with pumps of standard size.
- *Maximum dirt storage capacity...* for long, efficient service life before replacement.

*Registered Trade Mark

Micronic elements do not channel. They are waterproof and warp-proof and remain unaffected by engine temperatures. There's a Purolator to fit every vehicle, tractor and other gasoline- or diesel-engine-powered unit in service today. Write for our automotive catalog, No. 2054, to Purolator Products, Inc., Rahway, N. J., Dept. AI-716.



PUROLATOR PRODUCTS, INC., Rahway, New Jersey

Engine Combustion Processes

(Continued from page 108)

3500 F was described by C. R. Droms and A. I. Dahl, General Electric engineers. Calibration of this type of thermocouple and the various probe designs were reviewed in their paper.

Related problems of pressure drop and heat release in aircraft gas turbine combustion chambers were discussed in the paper of Dr. J. S. Clarke, director, Combustion Research Laboratories, Joseph Lucas, Ltd. An air-flow pattern was described that experience has shown provides a high heat release per unit volume with a short flame and intense turbulence. Flame stabilization also is assured over a wide range of conditions of ambient pressure and air mass flow.

Temperature Control

W. Tipler, of the Shell Petroleum Co., Ltd., London, in his paper made a comprehensive analysis of temperature control in combustion chambers. In the first part of his paper he outlined the basic data available to the combustion chamber designer. As to the swirl-type air director, he said the gaps in the fundamental data are rapidly being closed, the main weakness being the influence of fuel type on flame emissivity. He emphasized that very little is known about other air registers and if the design of combustion chambers using these alternatives is to be put on a firmer footing, research programs must be initiated to determine their influence on flame temperature and emissivity, and on convective heat-transfer rates.

BOOKS...

MATERIALS OF CONSTRUCTION, by Adelbert P. Mills, Harrison W. Hayward and Lloyd F. Rader, published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price, \$7.50. In this sixth edition, this widely used book has been expanded by 15 per cent and thoroughly revised to reflect the latest available data. Several new chapters have been introduced, but the approach to the subject remains essentially the same as in the past. Fundamentals are carefully treated in the early portion. Then, individual materials of construction are described in detail in separate chapters giving a clear and useful understanding of the manufacture, properties, methods of testing, and applications of these materials. Industrial as well as structural applications are included.

SOLVED

weighing
and
testing
problems
by



EMERY force-measuring systems

Emery load cells offer the fundamental solution to any force-measuring or weighing problem.

Operating on simple, basic physical principles, Emery systems are maintenance-free. Some units have been in service over 25 years without even recalibration!

RANGES: 0-10,000,000 pounds . . . **ACCURACY:** 1/10 of 1% of range . . . **RESPONSE:** less than 1/2 second . . .

TYPES: self-contained hydraulic, open-flow hydraulic, pneumatic . . . **CELL DEFLECTION:** less than 0.005" . . .

APPLICATIONS: Weighing, Jet Engine Thrust, Brake Testing, Torque Measurements, Strength of Materials, Process Control, Tank Weighing, Platform Scales, Etc.

Since 1872, Emery Force-Measurement Systems have been lowest in initial cost, in operating cost, and require no maintenance.

Write today for information on stock or specially designed systems to solve your force-measuring problems.



THE A. H. EMERY COMPANY, NEW CANAAN 8, CONN.

Please send me

- ☐ Literature on hydraulic weighing
☐ Literature on pneumatic weighing

NAME _____

POSITION _____

Attach to, or write on, your company letterhead.

News of the MACHINERY INDUSTRIES

(Continued from page 89)

MAPI Elects

Charles W. Stewart, Jr., was elected president of the Machinery and Allied Products Institute (MAPI) at the annual meeting of the Institute held recently in Washington. He will also serve as Chairman of the Council for Technological Advancement, an affil-

ate organization of the Institute.

At the same meeting of the Institute, member company representatives elected the Executive Committee for the next fiscal year and a full slate of officers.

Five industrialists in the capital goods field were elected MAPI vice presidents for the year commencing July 1, 1955. They are:

Robert W. Gillispie, chairman of the board, The Jeffrey Manufacturing Co., Columbus, Ohio; Alfred Iddles, president, The Babcock & Wilcox Co., New York; Morehead Patterson, chairman, American Machine & Foundry Co.,

New York; Guy A. Wainwright, president, Diamond Chain Co., Inc., Indianapolis; Thomas H. West, president, Draper Corp., Hopedale, Mass.

James D. Vaughan, vice president of ALCO Products Inc., has been re-elected MAPI treasurer for the next year.

The Big Squeeze

Bliss recently installed a 7000 ton capacity Hydro-Dynamic press at the Boeing plant in Wichita for forming large parts for the B-52 eight-jet bomber. A rubber pad is mounted on the bottom of the slide for the forming process.

A Merger

Just a short time ago, Leopold D. Silberstein, president of Penn-Texas Corp., obtained control of Niles-Bement-Pond Co. in a proxy battle and subsequently became president of N-B-P. Late last month another link in the chain went to the forge shop as Penn-Texas and N-B-P directors voted on a merger of the two companies. Of course, the final approval is up to the stockholders of both companies. AI's readers are very familiar with the products of N-B-P. Penn-Texas has a widely diversified range with oil, coal, gas, off-the-highway equipment, and even uranium.

Note—a New Name

From this month on, Colonial Broach Co. has taken on a new name—Colonial Broach & Machine Co. The company decided on the new title because of its broad scope in the market.

• • •

Sizable Market For Station Wagons Seen By Chevrolet

A further indication of the rapid growth of the station wagon market comes from Chevrolet, which produced more of the utility vehicles in the first four months of 1955 than it did during all of 1953. Similarly, Chevrolet's current production of station wagons has soared to 2½ times the 1954 rate.

The division forecasts that 10 per cent of all the automobiles it manufactures this year will be station wagons. It is interesting to note that nearly 25 per cent of all station wagons sold last year involved no trade-ins. This would seem to indicate that the vehicle is being selected by many buyers as either a first car in the family or as an additional one.

Chicago RIVET "912"

AUTOMATIC RIVET SETTER CUTS COSTS 3 WAYS

1 FASTENS FASTER . . .
Only the speed of the operator limits the 912's riveting speed. Completely automatic. A push on the foot pedal automatically feeds, inserts and clinches the rivet.

2 DOES WORK OF SEVERAL MACHINES
Quick change rotary hopper and race-way makes the 912 adjustable in 5 to 10 minutes to set different size rivets. Adjustable anvil height and 12-inch throat provide further versatility.

3 SAVES ON MAINTENANCE . . .
The 912 is massively built to stand the shocks of constant use and is designed for quick, easy servicing and parts replacement.

If your assembly calls for 3/16" steel tubular rivets or smaller, of 15/16" lengths or less, ask us to show you how the 912 can cut your fastening costs. Send a sample of your problem assembly (or blueprint) for a free fastening analysis.





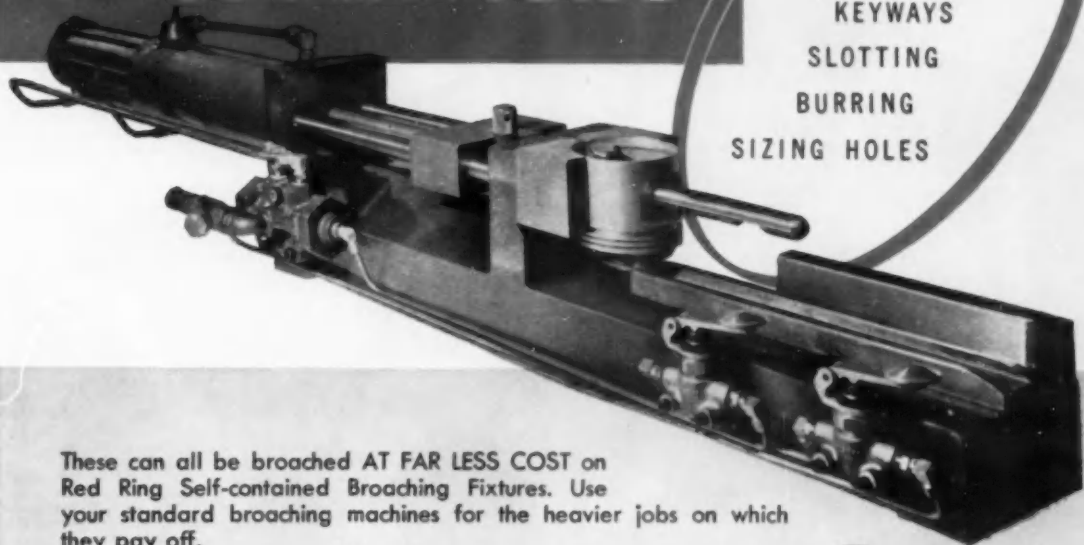
FREE CATALOG
contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.

Chicago Rivet & MACHINE CO.

9612 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois
Branch Factory: Tyrone, Pa.

Don't Let Small Parts Clutter Up Your **BROACHING OPERATIONS**

OIL GROOVES
SMALL SPLINES
SERRATIONS
KEYWAYS
SLOTING
BURRING
SIZING HOLES



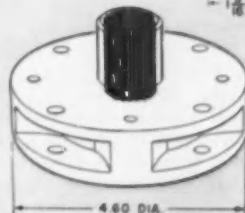
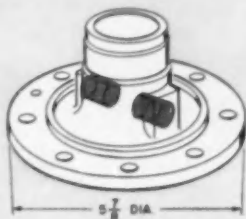
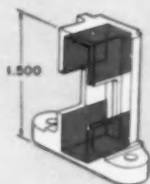
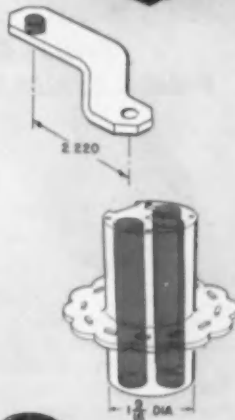
These can all be broached AT FAR LESS COST on Red Ring Self-contained Broaching Fixtures. Use your standard broaching machines for the heavier jobs on which they pay off.

The Self-contained Fixture has its own pneumatic power unit to pull or push the broach. Just set it on a table, connect it to the air line and you are ready to start broaching. Or you may want to mount it vertically to further economize floor space.

Like other fixtures or dies, these units may be stored in the tool room when not in use. They occupy little space and are easily portable.

Application is practically unlimited for jobs requiring a "Pull" of 2,000 lbs. or less and a stroke not exceeding 25 inches.

Call a Red Ring Broach Engineer or write for Bulletin B54-9 for more detailed information.



SPUR AND HELICAL
GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING
AND ELLIPTICAL TOOTH FORM



7018

NATIONAL BROACH & MACHINE CO.

3600 ST. JEAN DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

for **HEAVY DUTY** service



PEARLITIC MALLEABLE CASTINGS

The 2-speed truck axle is a *must* under varying load and road conditions because it provides a tailor-made ratio for every condition. But it takes a severe beating under heavy duty conditions encountered in logging, mining, farming, etc.

That's why Eaton Manufacturing Company, leading producer of 2-speed axles, specifies pearlitic malleable — from National — for several vital parts. For Eaton knows that pearlitic malleable has high ultimate strength... resists wear under heavy loads at high

speeds... possesses excellent non-seizing properties. In addition, pearlitic malleable can be given a smooth finish... can be either liquid or air quenched. And perhaps most important of all, *pearlitic malleable machinability index ranges from 80 to 90* (B1112 steel = 100).

Look your product over critically. Pearlitic malleable castings—from National—can replace costlier fabrication methods... can offer opportunities of reduction in weight, machining and assembly time.

AA-1191

Photos: Courtesy Eaton Manufacturing Company

NATIONAL MALLEABLE AND STEEL CASTINGS COMPANY

Cleveland 6, Ohio

The Nation's largest independent producer of malleable and pearlitic malleable

BOOKS...

SYMPOSIUM ON EFFECT OF CYCLIC HEATING AND STRESSING ON METALS AT ELEVATED TEMPERATURES, published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price, \$5.00. It has been long realized that much, if not most, engineering use of metals at elevated temperature involves periodic changes in temperature or stress or both. However, the engineer has available for most metals only constant stress and temperature data for design purposes. This poses the question of how changes in stress or temperature modify the constant stress and temperature behavior of metals and thus the designs based on such behaviors. This Symposium is intended to cover those situations involving relatively slow changes in stress or temperature or both. In practice many such changes are aperiodic, and much of the experimental work covering this Symposium uses periodic variations. It is hoped that certain general considerations may, however, be deduced from the experimental results herein.

BETTER ROADS FOR OUR GROWING NATION, published by the Chamber of Commerce of the U. S., Washington, D. C. Price, \$1.00. This is a summary report of statements made at the National Conference on Highway Financing, called by the Chamber of Commerce of the U. S. and held on Jan. 13 and 14, 1955, in Washington, D. C. The conference provided a public forum for discussion of important questions that must be answered if our street and highway system is to be modernized. It devoted special attention to the following five questions: should the Federal Government take over complete cost of modernizing the Interstate Highway System?; should state and local governments be encouraged to finance expanded road programs through borrowing and if so, how?; should toll road development receive federal coordination through financial aid where needed in the national interest?; should federal automotive excise tax revenues from highway users be devoted to highway financing?; and from what source should come the major share of additional highway construction money?

BETTER TOOL CRIBS, by William Raupold, published by Industrial Press, 148 Lafayette St., New York 13, N. Y. Price, \$4.00. This book was written to demonstrate that there is a way to avoid confusion and wasteful methods of conducting tool-crib functions, and that production gains to be derived from a well-organized crib are great enough to demand attention from all concerned with its operation. By means of profusely illustrated descriptions, the author shows in detail how such items as milling cutters, honing units, counterbores, fly cutters, measuring tools, gages, machine parts, and other shop tools and materials should be stored. In addition, several complete control systems are clearly described. The lay-out of a complete tool crib is taken up in step-by-step fashion. The smallest details of how to store tools and materials—and how to maintain proper control over these items—are thoroughly covered.

SYMPOSIUM ON RADIOACTIVITY, published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price, \$1.75. This symposium was prepared for the purpose of calling attention to the possible utilization of radioactive isotopes in testing. It is an effort to develop information for those who are in a position to put it to a practical use. Six papers are included in the symposium, in addition to a foreword and introduction.

VICKERS® ...the MOST EXTENSIVE LINE of hydraulic units complying with JIC STANDARDS

Shown here are only a few representative standard Vickers units that comply with JIC Standards... standards that are directed toward ease of maintenance, safety, longer life and uninterrupted machine production. "Undivided Responsibility" is another important advantage gained by specifying Vickers Units throughout a hydraulic system. For further information ask for new Bulletin 5002.



Vane Pump



Two Stage Vane Pump (2000 psi)



Double and Two-Pressure Vane Pumps



Variable Delivery Piston Type Pump

PUMPS



Power Unit is Self-Contained Hydraulic Power Source



Balanced Piston Type Relief Valve



Hydrocushion Type Sequence Valve



Hydrocushion Type Counterbalance Valve

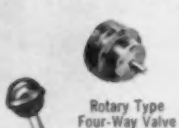


Pressure Reducing Valve



Flow Control Valve with Hydrostatic Compensator

PRESSURE CONTROLS



Rotary Type Four-Way Valve



Plunger Type Four-Way Valve



Pilot Operated Four-Way Valve



Solenoid Controlled Pilot Operated Four-Way Valve



Check Valve



Manually Operated Four-Way Valve



Solenoid Operated Four-Way Valve



Deceleration Valve

DIRECTIONAL CONTROLS



Constant Displacement Piston Type Motor



Variable Displacement Piston Type Motor



Balanced Vane Type Motor



Hydraulic Cylinders

MOTORS

ACCESSORIES



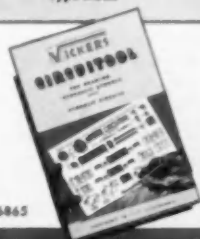
Accumulators



High Pressure Type Micronic Oil Filters



Traverse and Feed Cycle Control Panel



4865

WRITE for your copy

Vickers Circuitool consists of a handy, transparent plastic guide and a 24-page manual to speed the drawing and to promote symbol (JIC) uniformity of hydraulic circuits.

VICKERS Incorporated

DIVISION OF THE SPERRY CORPORATION

1428 OAKMAN BLVD. • DETROIT 32, MICH.

Application Engineering Offices: ATLANTA • CHICAGO
AREA (Brookfield) • CINCINNATI • CLEVELAND
DETROIT • HOUSTON • LOS ANGELES AREA (B)
Segundo • NEW YORK AREA (Summit, N. J.) • PHILA-
DELPHIA AREA (Media) • PITTSBURGH AREA (Mt.
Lebanon) • ROCHESTER • ROCKFORD • SAN FRAN-
CISCO AREA (Berkeley) • SEATTLE • ST. LOUIS
TULSA • WASHINGTON • WORCESTER

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

More Government Contract Awards

THIS latest list of Government prime contracts that have been awarded covers the period from May 23 to June 15, 1955. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, airplanes, automotive components and spare parts, automotive maintenance equipment, etc.

ACF INDUSTRIES, INC., Engineering and Research Div., Hyattsville, Md.
Fight simulator, spares and support—\$1,477,935

AINSWORTH MANUFACTURING CO., Detroit, Mich.
Spare parts—1937—\$29,078

AIRESEARCH MANUFACTURING CO., Div. of Garrett Corp., Los Angeles, Calif.
Maintenance parts—various—\$76,888

AIR-MAZE CORPORATION, Cleveland, Ohio
Fuel and oil filter, parts—26 items—\$147,915

AMERICAN BOSCH ARMA, American Bosch Div., Springfield, Mass.
Repair parts for Diesel engines—6465—\$127,242

AUTOMATIC TRANSPORTATION CO., Div. of Yale & Towne Mfg. Co., Chicago, Ill.
Truck, pallet—46—\$44,214

AVCO MANUFACTURING CORP., Lymington Div., Stratford, Conn.
R-1820-103 engines, special tools—114—\$2,638,104
R-1820 engine special tools—\$44,397

THE BAKER-RAULANG COMPANY, Cleveland, Ohio
Truck, forklift—194—\$394,170

BEECH AIRCRAFT CORP., Wichita, Kan.
Hub assembly, nut, bulkhead assembly—441—\$141,029
Gear assy.—835—\$124,636

BENDIX AVIATION CORP., Bendix Products Div., South Bend, Ind.
Brake assys.—168—\$123,453
Maintenance parts—various—\$42,306

BENDIX AVIATION CORP., Scintilla Div., Sidney, N. Y.
Maintenance parts—various—\$68,849

CLARK EQUIPMENT COMPANY, Battle Creek, Mich.
Truck, forklift—20—\$132,004
Trucks, fork—4—\$31,158

CONTINENTAL MOTORS CORP., Muskegon, Mich.
Repair parts for Diesel engines—2625—\$31,425

CONTINENTAL MOTORS CORP., Detroit, Mich.
Gasoline engine—41—\$397,700

CURTISS-WRIGHT CORP., Wright-Aeronautical Div., Wood-Ridge, N. J.
Gearbox—305—\$448,314

CURTISS-WRIGHT CORP., Metal Processing Div., Buffalo, N. Y.
Design, manufacture and acquisition of machinery and equipment—\$700,000

DEERE & COMPANY EXPORT DEPT., Moline, Ill.
Farm tractors—\$10,487

DIAMOND T MOTOR TRUCK SALES, Washington, D. C.
Trucks—4 ea.—\$37,472

DOUGLAS AIRCRAFT COMPANY, Santa Monica, Calif.
Maintenance parts—various—\$185,021

FAIRCHILD ENGINE & AIRPLANE, Farmingdale, L. I., N. Y.
Kit, automatic rewind engine rope starter—7000 ea.—\$188,440
Supercharger assys.—21 ea.—\$46,347

FARGO MOTOR CORP., Washington, D. C.
Trucks—21 ea.—\$43,539

FORD MOTOR COMPANY, Dearborn, Mich.
Jet engines—763—\$195,572,897
(Turn to page 160, please)



**"I Don't Take
Chances on
Shipping
Containers!"**

**"I Always
Order**



Some shipping containers are satisfactory—there are others which are not. You can be certain of obtaining well made and dependable boxes and crates if you specify **SUPERSTRONG**.

One hundred years of experience cannot be disregarded. There is no better assurance of know-how, and of loyal and satisfied customers.

Send for our illustrated brochure. It describes all **SUPERSTRONG** products—and the facilities that produce them.

WIREBOUND BOXES and CRATES
WOODEN BOXES and CRATES
CORRUGATED FIBRE BOXES
BEVERAGE CASES
STARCH TRAYS . . . PALLETS



RATHBORNE, HAIR AND RIDGWAY BOX CO.
1440 WEST 21st PLACE • CHICAGO 8, ILLINOIS



Send For Free Print—1912 Hupmobile "20"

For years a popular and successful car, the 1912 Hupmobile "20" had a 16-20 H.P. four-cylinder L-head engine, multiple-disc clutch, selective transmission with two speeds forward, splash-lubricated engine, and expanding rear-wheel brakes.

This is one of a series of antique automobile prints that will appear in future Morse advertisements. Write for your free copy, suitable for framing. Morse Chain Company, 7601 Central Avenue, Detroit 10, Michigan.

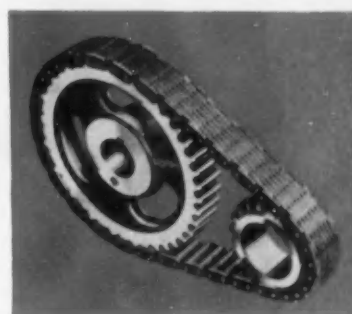
Why Morse Timing Chains are used as original equipment by 13 out of 17 automobile manufacturers

Thirteen of the seventeen automobile manufacturers who now use timing chain drives as original equipment, specify Morse Timing Chain Drives. This is true for several reasons:

(1) Morse Timing Chain Drives assure car, bus, and truck manufacturers of long, trouble-free service life—eliminate maintenance difficulties. (2) Morse Timing Chain Drives offer safe, quiet, and smooth operation, even when camshafts and crankshafts are not exactly parallel. (3) Speedy delivery of a

complete line of timing chain drives helps to meet production schedules. (4) Morse offers expert engineering service to assist in solving timing chain problems of design, development, and application.

Check with Morse on your timing chain problems. Find out, too, how well other Morse Power Transmission Products can answer your needs in product design and application. **MORSE CHAIN COMPANY, 7601 CENTRAL AVENUE, DETROIT 10, MICHIGAN.**



MORSE



**CHAINS, CLUTCHES,
AND COUPLINGS**

FOR 24 REASONS, MASTERS OF MECHANICAL POWER TRANSMISSION SINCE 1893

											
1 STANDARD ROLLER CHAINS	2 HIGH ENDURANCE ROLLER CHAINS	3 SPRING-LOCK ROLLER CHAINS	4 ROLLER CHAIN SPROCKETS	5 TAPER LOCK SPROCKETS	6 DOUBLE PITCH ROLLER CHAIN DRIVES	7 EAGLE CHAIN	8 ATTACHMENT CHAINS	9 SILENT CHAINS	10 SILENT CHAIN SPROCKETS	11 HY-VO DRIVES	12 AUTOMOTIVE TIMING CHAIN DRIVES
											
13 FLEXIBLE ROLLER CHAIN COUPLINGS	14 FLEXIBLE SILENT CHAIN COUPLINGS	15 MORTISE COUPLINGS	16 MORTISE RADIAL COUPLINGS	17 MORTISE & RADIAL DRIVE SHAFTS	18 MARINE COUPLINGS	19 OVER-RUNNING CLUTCHES	20 OVER-CENTER CLUTCHES	21 PULLMORE CLUTCHES	22 TORQUE LIMITER	23 CENTRIFUGAL CLUTCHES	24 VARIABLE SPEED CONTROLS

FORK LIFT TRUCKS AND TRACTORS SINCE 1919
Manufactured Only By Towmotor Corporation • The Pioneer Maker Of Fork Lift Trucks

TOWMOTOR... THE EFFICIENCY KING OF LP-GAS INDUSTRIAL TRUCKS



Smooth
Performance

Long
Engine Life

No Objectionable
Fumes

Low
Fuel Cost

Long
Oil Life

Less
Maintenance

Towmotor LP-Gas Trucks offer a new high in performance and efficiency. Users save on fuel, oil and maintenance, because LP-Gas costs less, doesn't dilute crankcase oil and leaves no carbon or gum deposits.

For the highest efficiency in fork lift operation see your nearby Towmotor Representative... you'll find a complete line of constant power fork lift trucks for every requirement. Consult your Telephone Directory or write TOWMOTOR CORPORATION, Div. 4507, 1226 E. 152nd St., Cleveland 10, Ohio.

TOWMOTOR
THE ONE MAN GANG

(Continued from page 158)

**FORD MOTOR CO., Ford Div., Wash-
ington, D. C.**

Automobiles—66—\$90,921
Light trucks—461—\$586,185
Trucks—40—\$103,813
Automobiles, station wagons—17—\$27,580
Pickup trucks—10 ea.—\$13,768

**FORD MOTOR CO., Ford International,
New York, N. Y.**
Trucks—3 ea.—\$10,884

**GENERAL MOTORS CORP., Allison Div.,
Indianapolis, Ind.**
Ring gear—1825 ea.—\$70,992
Turbo-jet aircraft engine—46—\$930,580

**GENERAL MOTORS CORP., Allison Div.,
Dayton, Ohio**
Spare propeller parts—\$280,664

**GENERAL MOTORS CORP., Buick Motor
Div., Flint, Mich.**
Modification of J65-B-3 engines—383—
\$594,799

**GENERAL MOTORS CORP., Chevrolet Mo-
tor Div., Detroit, Mich.**
Light trucks—335—\$414,778
Automobiles—12 ea.—\$16,149

**GENERAL MOTORS CORP., Cleveland
Diesel Engine Div., Cleveland, Ohio**
Repair parts—10,321—\$360,692

**GENERAL MOTORS CORP., Detroit Diesel
Engine Div., Detroit, Mich.**
Repair parts—54,393—\$190,151

**GENERAL MOTORS CORP., GMC Truck &
Coach Div., East Pontiac, Mich.**
Auto parts—41,390—\$837,653
Spare parts—34,906—\$967,867

**GENERAL MOTORS CORP., United Mo-
tors Service Div., Detroit, Mich.**
Spare parts—866—\$27,027

**THE GOODYEAR TIRE AND RUBBER CO.,
INC., Akron, Ohio**
Brake assys.—444—\$112,034

**GRUMMAN AIRCRAFT ENGINEERING
CORP., Bethpage, L. I., N. Y.**
Maintenance parts—various—\$530,875

THE HEIL COMPANY, Milwaukee, Wis.
Refueler, aircraft—26—\$112,089

**THE FRANK G. HOUGH COMPANY,
Libertyville, Ill.**
Tractor, Diesel—57—\$413,341

HYSTER COMPANY, Portland, Ore.
Crane, tractor mounting—20 ea.—\$200,000

**INTERNATIONAL HARVESTER CO., Wash-
ington, D. C.**
Light trucks—59—\$100,275
Trucks—8 ea.—\$38,042

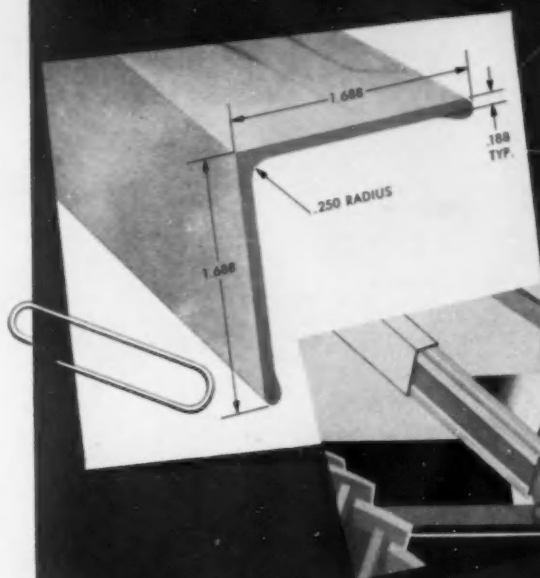
**INTERNATIONAL HARVESTER EXPORT
CO., Chicago, Ill.**
Trucks—15—\$27,519

**LA CROSSE TRAILER CORP., Washington,
D. C.**
Trailers—14 ea.—\$29,300

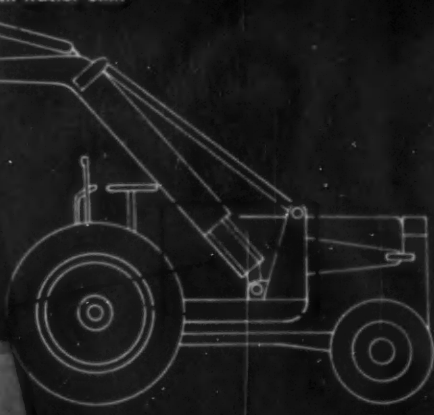
**THE GLENN L. MARTIN COMPANY,
Baltimore, Md.**
Parts—various—\$113,561

**MASSEY - HARRIS - FERGUSON, INC.,
Washington, D. C.**
Farm tractors—\$32,469

(Turn to page 164, please)



Extruded aluminum is lighter, easier to replace, wears longer. Eight angle lengths are used on each tractor unit.



A single Harvey extrusion, needing only cutting to length and drilling, forms this tractor part. Easier to make, it is also better to use.

Aluminum for a skip-loader

...here's how it works

Construction men demand two qualities in their equipment. First, it must be rugged. Second, replacements must be held to a minimum.

Harvey aluminum extrusions help build both of these qualities into a well-known line of tractor accessories... more effectively and at lower cost than with materials formerly used. Most critical point in the basic unit is the telescoping tension arm supporting various attachments. The wear plates under the sliding arms had been a constant source of trouble. Brass proved too heavy, too costly. Then aluminum sheet, bent and heat-treated, was tried... some saving, but still too

costly because of complex fabrication and excessive scrap.

A Harvey Field Engineer suggested changing to a single Harvey Extrusion, made of Harvey Alloy 6066, in the exact cross section needed. The result: (1) an easier product to make, saving 42¢ per wear plate; (2) a better product to sell... plates are lighter, easier to replace and wear longer.

MAKING THE MOST OF ALUMINUM... FOR EVERYONE

HARVEY Aluminum

HARVEY ALUMINUM SALES, INC., TORRANCE, CALIFORNIA
BRANCH OFFICES IN PRINCIPAL CITIES

as a leading independent producer of aluminum extrusions in all alloys and all sizes, special extrusions, press forgings, hollow sections, structurals, rod and bar, forging stock, pipe, tubes, impact extrusions, aluminum screw machine products and related products. Also similar products in alloy steel and titanium on application.

RESEARCH...DEVELOPMENT...PRODUCTION...Harvey does all three



For your aluminum needs, call a Harvey Field Engineer today. His one job is to put custom-designed aluminum to work for you. With your own engineers and designers, he can help tailor aluminum extrusions to your requirements of alloy, temper, cross section and length. Both production and cost problems often vanish.

THE second annual Japanese Motor Show, held recently in Tokyo, presented a panoramic view of the activities of the vehicle industries in Japan today. A total of 104 exhibitors occupying 217 stands displayed passenger cars, commercial vehicles, tricycles, motorcycles, parts, accessories, and allied products.

Passenger Cars

Toyota Motor Co., which was established in 1937, exhibited two new four-door, six-passenger sedans—the Toyopet Crown RS and Toyopet Master

RR. Both weigh 2700 lb with a 100-in. wheelbase and are powered by a four-cylinder, ohv, 48-hp engine, which has a bore of 3 1/32 in. and stroke of 3 1/16 in. The rear suspension has direct acting shock absorbers and a prominent feature is the three-leaf-type elliptic spring. This was adopted

Many Versatile Motor Vehicles Demonstrated at Japanese Show

By Kazuhiko Aoki

to reduce the friction between leaves and is said to increase the riding comfort. The remote-control-type transmission has a synchromesh unit for second and third, and a hypoid gear set is used for final reduction.

Fuji Precision Machinery Co., Ltd., which was organized in 1950, manufactures only light vehicles, including the Prince AISH-IV four-door sedan. It has a 90 cu in., four-cylinder, 52-hp engine, seats six passengers, and weighs 2800 lb. This car also has elliptic springs consisting of only four leaves, and the transmission is the synchromesh type. This factory was formerly famous for the production of "Zero" fighters and other planes under the name of the Nakajima Aircraft.

Nissan Motor Co., which has manufactured light passenger and commercial vehicles since 1933, introduced the new Datsun 110 sedan with a length of 152 in., width of 58 in., and weight of 2500 lb. It is powered by a four-cylinder, 25-hp engine.

Ohta Motor Co. exhibited a new four-door sedan, the Ohta PK-1, with a wheelbase of 85 in. and powered by a 26-hp, four-cylinder engine. This company also has manufactured an experimental car with torsion bar suspension, but it was not displayed at the show.

Various foreign light cars are now manufactured in Japan. At first, Japanese factories merely assembled the parts shipped, but the number of domestic-made parts has been increasing gradually. These cars have had the effect of introducing new design and manufacturing techniques to Japan. The Austin Cambridge A 50 sedan, Hillman Minx, Renault PA 55, and Willys Jeep CJ3B-J3 are produced by the Nissan, Isuzu, Hino, Shin-Mitsubishi factories, respectively, and were exhibited at the show.

Buses

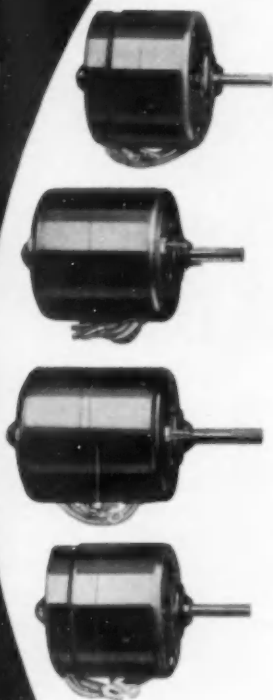
While most of the Japanese bus manufacturers use their traditional power plants, Minsei Diesel Engineering Co. introduced a novel type of Diesel engine. In 1936, under a license from Krupp Junkers (Germany), this factory originated production of an opposed-piston, uniflow, direct-injection-type Diesel engine under the name of KD, and applied one of the four-cylinder types to commercial vehicles.

The new engine is a uniflow, direct-injection, two-stroke unit, of which

Leece-Neville

... a reliable
source for
SMALL MOTORS
in LARGE
VOLUME

- for • HEATERS • WINDSHIELD WIPERS
• DEFROSTERS • SEAT ADJUSTERS
• AIR CONDITIONERS • CAR COOLERS
• PUMPS • WINDOW REGULATORS
• MARINE VENTILATORS



Leece-Neville Small Motors are produced for automotive use in 6 volt to 32 volt systems. Higher voltage motors are available for other applications. For full information, write The Leece-Neville Company, Fractional H. P. Motors Division, Cleveland 13, Ohio.

YOU CAN
RELY ON

Leece-Neville

AUTOMOTIVE ELECTRICAL EQUIPMENT
SINCE 1909

three and four-cylinder types are being produced at present. A two-bladed Roots type blower is used for the scavenging and special equipment is available for supercharging. The bore and stroke are 8 5/16 in. and 5 1/4 in., respectively, and the four-cylinder unit develops 150 bhp at 2000 rpm. This newly designed engine weighs only 1300 lb. Minsei mounts this engine on the RS-type, rear-engine buses named Eagle and Condor. They have a length range from 29 to 33 ft and seat 57 to 68 passengers.

Isuzu Motor Co. also has a BX series of rear-engine buses with the 48 DA type 100-hp Diesel or DG 32 105-hp gasoline engine as power plants. The former develops 115 hp when supercharged. Torque converters for these buses, as well as for light and heavy cars, have been produced as MT 10, 20, and 30 models by way of experiment, but they have not yet reached quantity production.

Mitsubishi-Fuso's rear-engine RZ bus has an overall length of 34 ft for 68 passengers. It is powered by the DB 5A type 130-hp Diesel engine, which will be furnished with a supercharger in the near future.

Hino Diesel Engineering Co. originated the underfloor-engine bus in Japan with power plant mounted amidships. The 1955 Model BD-12 has an overall length of 33 ft for 73 passengers. It is powered by a six-cylinder, horizontal-type, 125-hp engine with a bore of 4 1/2 in. and a stroke of 5 5/16 in.

In addition to regular buses, a small route RK bus for nine passengers is also manufactured by Toyota. Nissan produces the rear-engine Corona BU 90 and MBU 90 buses, which are equipped with gasoline or Diesel engines.

Trolley buses are used to some extent in the large cities. Hino makes the MC 207 type, which has an overall length of 33 ft, weighs 1700 lb, and is driven by a 135-hp electric motor.

The trailer bus was once very popular, but, as Japan has very narrow roads and sharp corners, it gradually lost favor. Now only one factory (Hino) produces the MT 26 trailer bus with overall length of 46 ft, weight of 25,000 lb, and a DA 55 110-hp Diesel engine.

Trucks

Compared with buses and passenger cars, no great changes could be found in the truck field at the show. Most trucks are conventional types with load capacities from 7000 to 18,000 lb. Only one type of truck-trailer is manufactured by Hino; it has a capacity of 33,000 lb, and an overall length of 36 ft.

Various dump trucks are manufactured by Nissan, Toyota, Hino, and Mitsubishi-Fuso. The last-named makes a vehicle with GVW of 60,000 lb powered by a 200-hp Diesel engine. Mitsubishi-Fuso. The last-named makers produce earthmovers, such as 44,000-lb truck cranes, rubber-tired tractors, etc., but only a very few were exhibited.

Tricycles

The three wheelers, or tricycles, are most popular in Japan because of their low price and fuel consumption.

The number of such vehicles registered today amounts to some 400,000 units.

The tricycles were very light types at first, but their load-carrying capacities now range up to 4400 lb. Air-cooled engines of 15 to 40 hp are used. Fire engines, tank trucks, and even several types of dump trucks modeled from these tricycles were exhibited.

Two types of watercooled engines were introduced at the show — the Orient and the Giant. The former has wet cylinder liners in a two-cylinder,

(Turn to page 190, please)



**Now EVERY Fleet
in America can afford
Leece-Neville
Alternators**

**SENSATIONAL LOW PRICE ON
NEW L-N ALTERNATOR SYSTEM**

The new Leece-Neville Alternator brings to fleets of passenger cars, light and medium trucks all the famous advantages that larger L-N Alternators have proved by performance for over nine years: charging current with engine idling, high output, low maintenance cost. Plus new, simplified bracketing. Yet the new L-N Alternator System actually costs less than "extra" output d. c. generators.

L-N ALTERNATORS FOR EVERY APPLICATION

There's a right L-N Alternator for every fleet unit. Capacities range from 60 amps for 6-volt systems to 180 amps for 12 volt. L-N Alternators will keep your fleet on the job and out of the repair shop. Why not get the whole story? Just write The Leece-Neville Company, Cleveland 14, Ohio. Distributors in principal cities . . . service stations everywhere.



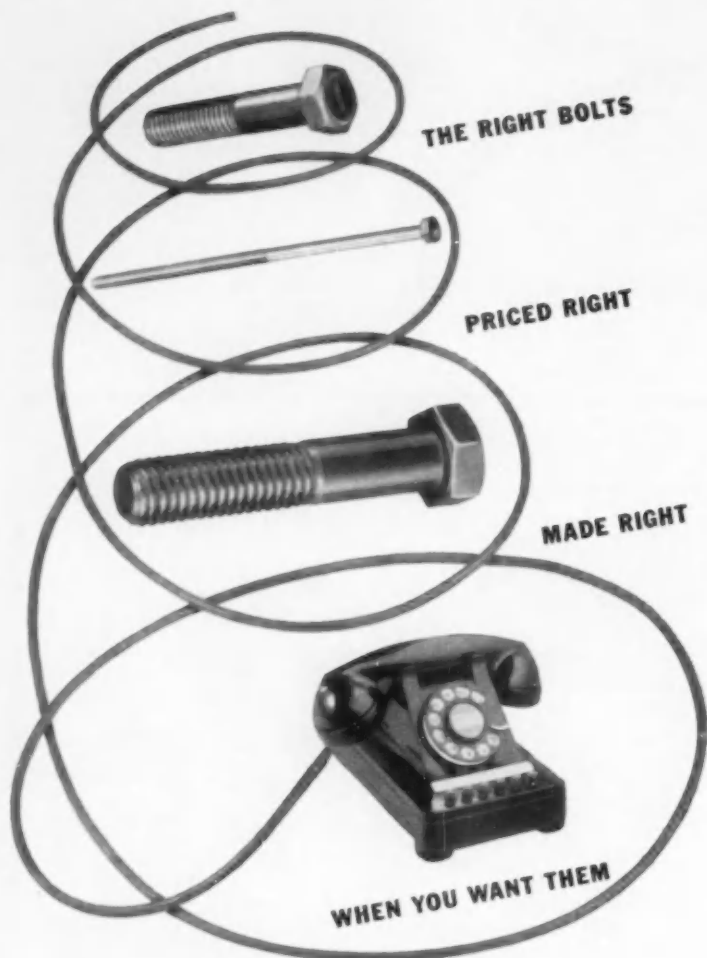
**ON YOUR NEW UNITS SPECIFY LEECE-NEVILLE EQUIPMENT.
FACTORY-INSTALLED**

**YOU CAN
RELY ON**

Leece-Neville

ALTERNATOR SYSTEMS • GENERATORS
STARTING MOTORS • REGULATORS • SWITCHES
FRACTIONAL HP MOTORS

TRUCK PASSENGER	BUS RAILROAD	DIESEL MARINE	INDUSTRIAL OFF HIGHWAY
--------------------	-----------------	------------------	---------------------------



BUFFALO BOLT SERVICE *completes* *the picture*

It's our aim to see that you get the right bolts...
when you need them.

That's why we have set up the finest and fastest service
organization in the business.

Now you can get immediate and accurate information
on prices, deliveries or other pertinent data...by merely calling
your Circle **B** distributor or our
nearest District Office.
Try it on your next fastener order.

DISTRICT OFFICES

WESTERN OFFICE
Chicago
Harrison 7-2179

EASTERN OFFICE
New York City
REctor 2-1888

CENTRAL OFFICE
North Tonawanda
JAckson 2400 (Buffalo)



BUFFALO BOLT COMPANY

Division of Buffalo-Eclipse Corporation
NORTH TONAWANDA, N. Y.

Making both FASTENERS & FRIENDS for 100 years

(Continued from page 160)

NORDBERG MANUFACTURING COM- PANY, Milwaukee, Wis.

3600 hp diesel engines, hydraulic coup-
plings, reduction gears—11—\$1,516,115

NORTH AMERICAN AVIATION, INC., Columbus Div., Columbus, Ohio

Maintenance parts—various—\$235,419

NORTHWESTERN MOTOR COMPANY, Eau Claire, Wis.

Tractors, warehouse—15—\$29,890

OSHKOSH MOTOR TRUCK, INC., Osh- kosh, Wis.

Truck tractors—2 ea.—\$30,052

REO MOTORS, INC., Washington, D. C.

Trucks—14 ea.—\$93,042

REO MOTORS, INC., Lansing, Mich.

Kit, winch and power take-off—586—
\$234,382

Trucks, 2½ ton—54—\$185,229

ROSS GEAR AND TOOL CO., Lafayette, Ind.

Gear, steering—3005—\$143,113

STANDARD MANUFACTURING CO., INC., Dallas, Texas

Truck bomb lift—8 ea.—\$480,673

STUDEBAKER-PACKARD CORP., Detroit, Mich.

Repair parts for Diesel engines—14,582
—\$31,163

THOMPSON PRODUCTS, INC., Cleveland, Ohio

Pump assy. fuel—3 items—\$100,727

WILLYS MOTORS, INC., Washington, D. C.

Station wagons—9 ea.—\$15,658

WILLYS MOTORS, INC., Engine Div., De- troit, Mich.

R-1300 engine, spare parts—530,548 ea.
—\$220,959

WILLYS MOTORS, INC., Toledo, Ohio

Jeeps and spare parts—lot—\$31,685

Trucks—37—\$52,121

Vehicles and spare parts—20 ea.—\$31,685

Light trucks—93—\$153,952

Jeeps—18 ea.—\$23,546

Jeeps and station wagons—22 ea.—\$38,144

Jeeps and spare, station wagons and
spare parts, pickup trucks and spares
—30—\$52,268

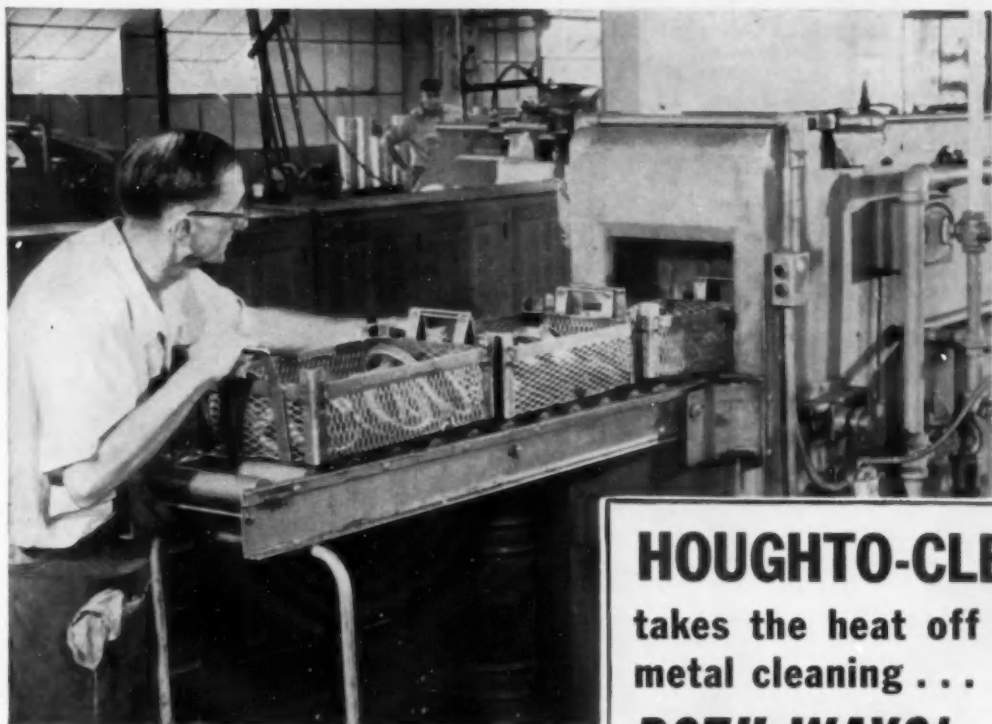
YALE AND TOWNE MFG. CO., Yale Materials Handling Div., Phila., Pa.

Trucks, low lift—6—\$52,200

Bendix Plane Brake Lining Offered Other Industries

Ceramic-base lining used on air-
craft brakes now is being adapted to
automotive and industrial clutch lin-
ings. The special material, called Cer-
ametalix, is manufactured by the Mar-
shall-Eclipse Div. of Bendix Aviation
Corp. Advantages claimed are in-
creased torque grip and higher heat
capacity.

Installing the lining is relatively
simple, according to Bendix. Shallow
metal cups, containing the special
material, are merely attached to the
clutch plate.



HOUGHTO-CLEAN
takes the heat off your
metal cleaning . . .
BOTH WAYS!

HOUGHTON COLD CLEANERS

- *keep cleaning room temperature lower*
- *keep cleaning room morale higher*

Effective in either still tank or power washers, HOUGHTO-CLEAN room temperature metal cleaners provide these new economies for you—welcome benefits for workers:

- Eliminate costly heating equipment and high fuel costs.
- Solution life is long—and easy to mix.
- Higher worker morale—no warm weather dip in production.
- Parts are never too hot to handle.
- Hot, steamy installations are eliminated.

It will pay you to investigate the many advantages of HOUGHTO-CLEAN Cold Cleaners and how they can be applied to your operation. Call the Houghton Man, or write to E. F. Houghton & Co., 303 W. Lehigh Avenue, Philadelphia 33, Pa.

HOUGHTO-CLEAN COLD CLEANERS

...products of

E. F. HOUGHTON & CO.
PHILADELPHIA • CHICAGO • DETROIT • SAN FRANCISCO



*Ready to give you
on-the-job service . . .*

Industry News

(Continued from page 106)

Chrysler Aide Cites Aspects Contributing To Safer Cars

Factors that reportedly make this year's automobiles the safest in history were outlined recently by H. R. Steding, chief engineer-executive staff of Chrysler Corp. Although some sources may continue to dispute it, increased horsepower, automatic

transmissions, power brakes and power steering have played a vital part in curbing accidents, in Mr. Steding's opinion.

Higher performance engines Mr. Steding pointed out, enable a driver to pass another car more quickly; wider brake pedals provided on cars equipped with automatic transmissions permit a driver to have his left foot poised on the pedal at all times, thus cutting down on reaction time; and power steering gives the driver better control of the car at all times. Other safety factors he cited are

greater visibility through wrap-around windshields, greater seeing distance with new improved headlights, and improved tires.

Improvements in structure have resulted in much stronger bodies, and suspensions have been redesigned to give better road-holding stability and handling ease, Mr. Steding observed. He also said that general design of automobiles also has been a big factor in improving safety.

Nance Re-elected President of AMA

James J. Nance, who succeeded the late George W. Mason as president of the Automobile Manufacturers Association in February, has been re-elected head of AMA. He is the second Packard executive to hold that post since the organization was established in 1913.

Re-elected as vice presidents of AMA were Harold S. Vance, chairman of the executive committee of Studebaker-Packard Corp., and E. J. Bush, president of Diamond T Motor Car Co. Others re-elected were Harlow H. Curtice, president of GM, secretary; George W. Romney, president of American Motors Corp., treasurer; Alfred Reeves, advisory vice president; and William J. Cronin, managing director.

Newly elected directors include George W. Troost, Chrysler Corp. vice president, and J. J. Timpy, vice president of American Motors. Re-elected to the directorate were L. L. Colbert, Chrysler Corp. president and Messrs. Bush, Curtice, and Romney.

Chevrolet Creates Department For Engineering Information

Chevrolet has formed an Engineering Product Information Dept. headed by W. R. Mackenzie. Principal function of the unit will be to gather information from all engineering groups within the division for use by Advertising and Sales Promotion Depts. It also will provide data for technical papers and other information for presentation at engineering schools and for other special activities.

Second Ordnance Contract For Trucks Given to Mack

The second Ordnance contract within two weeks has been granted to Mack Manufacturing Co. Valued at \$1.53 million, the latest award calls for the production of five-ton trucks.

(Turn to page 174, please)



*for today's
"power-loaded"
engines...*

**BORG
AND
BECK**

CLUTCHES

**MAXIMUM PERFORMANCE
MINIMUM MAINTENANCE**

Through advanced design and creative engineering, BORG & BECK has stepped up the capacity of its passenger car clutches without increasing their over-all dimensions. Compact, light in weight, precision built—for maximum performance, minimum maintenance.

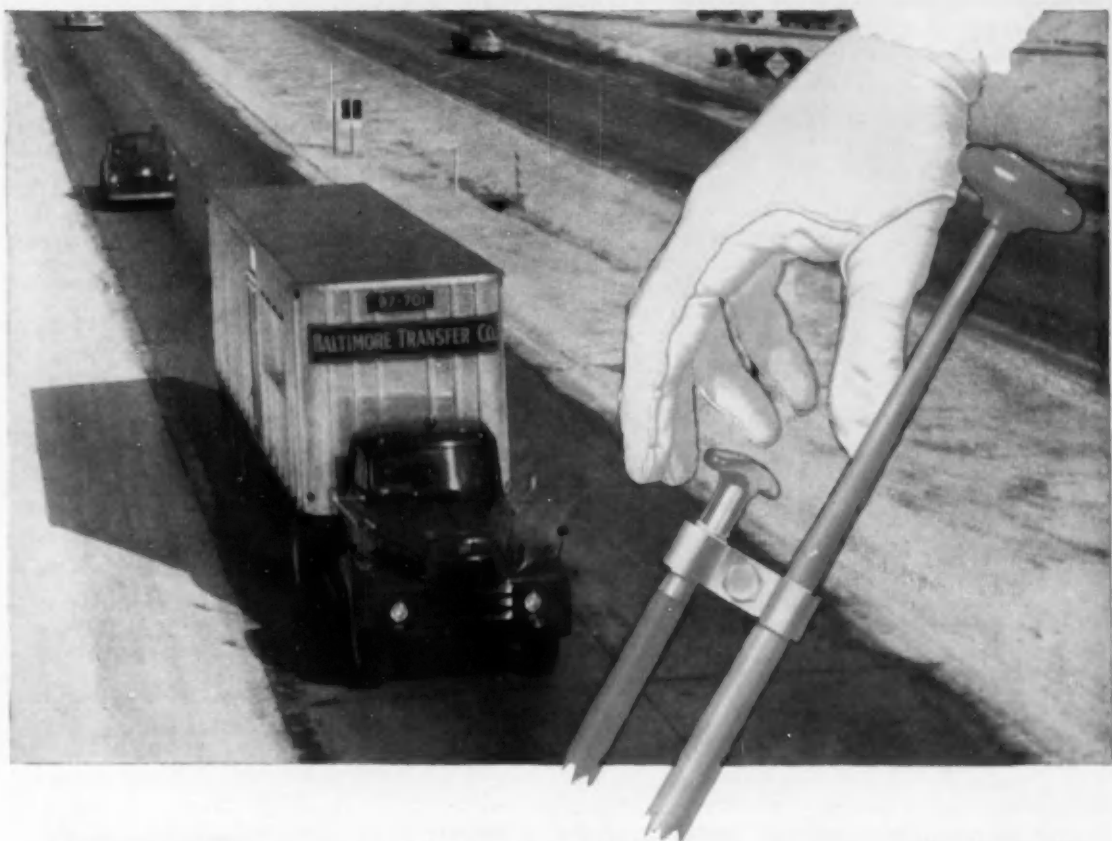
for that vital spot where power takes hold of the load



BORG & BECK

DIVISION OF BORG-WARNER

Chicago 38, Illinois



ROADRANGER® provides annual fuel savings of \$126.36 per tractor

Up to 43% faster trip time and average fuel savings of \$126.36 per tractor annually were enough to convince Baltimore Transfer Company. They now specify Fuller R-45 Semi-Automatic ROADRANGER Transmissions for every new tractor purchased.

Baltimore Transfer and its wholly-owned subsidiary—Motor Freight Express—is ordering 48 International R-195 tractors per year, and expects to increase to 96 a year by 1957.

The Fuller Semi-Automatic ROADRANGER was tested by Baltimore Transfer on its own routes, under its own operating conditions, against

conventional 5-speed transmissions with 2-speed rear axles. Both transmissions were installed in identical International R-195's, with identical loads.

On a stretch between Baltimore and Blue Mountain, Pa. (22 miles, over hilly terrain) the ROADRANGER-equipped tractor came in 27 minutes ahead of the tractor with the main-and-2-speed axle combination.

Through single-lever control of all forward speeds—and with all ratios evenly and progressively spaced—the Fuller Semi-Automatic ROADRANGER lets the driver select the right ratios

at the right time, without having to tussle with gear splits or sit waiting on automatic actuation.

On your trucking operations, the result will be more speed on hills, steadier speed in traffic, lower fuel consumption and less engine maintenance. See your truck dealer, ask him for full details on Fuller Semi-Automatic ROADRANGER Transmissions.

where horsepower ^{really} goes to work



FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO, MICHIGAN

Unit Drop Forge Div., Milwaukee 1, Wis. • Shuler Axle Co., Louisville, Ky. (Subsidiary) • Sales & Service, All Products, West. Dist. Branch, Oakland 6, Cal. and Southwest Dist. Office, Tulsa 3, Okla.

WHAT'S NEW in automatic systems



This Binks automatic spray painting system tirelessly applies a beautiful finish to the exterior of Nash and Hudson Rambler bodies. Special adaptations permit rapid color changes.

Automatically...Rambler bodies get a perfect finish...every time

Automatic spray painting systems are the surest guarantee of consistent high quality and uniformity of product finishes... and they do the work faster... and more economically.

An excellent example is the automatic finishing system in operation at the Kenosha Assembly Plant of American Motors Corp. This system automatically applies a uniform finish to the exterior surface of Rambler bodies.

A coating of primer and either one or two color-tones are applied to each body as it passes through the Binks down-draft water wash spray booths. Tripping levers automatically activate the spray guns, as they oscillate back and forth over the body. The spray guns mounted

at the top of the booth first paint the trunk deck, then as the body moves forward, rise automatically to finish the roof. The guns again lower to coat the cowl. The system automatically compensates for variations in body styles. A similar system is also in operation in the American Motors Milwaukee plant.

Free engineering help.

Automatic equipment of this kind is indicative of what can be accomplished when plant operating engineers work closely with Binks engineers on a specific problem. Binks' broad experience in this field is available to you without obligation. Just contact your nearest Binks Branch Office or write direct to the address below.

22-95-55

Binks
EVERYTHING FOR

SPRAY PAINTING



GUNS



SPRAY BOOTHS



FREE INSTRUCTION

BINKS MANUFACTURING COMPANY

3120-30 Carroll Ave., West, Chicago 12, Illinois

REPRESENTATIVES IN PRINCIPAL U. S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

New Defense Facilities

SUPPLEMENTING the list of Certificates of Necessity issued up to May 4, 1955, authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which was published in the June 15 issue, page 158, of **AUTOMOTIVE INDUSTRIES**, the following additional certificates were announced by the Office of Defense Mobilization, covering the period from May 5 to June 1, 1955.

The figure appearing in parentheses is the percentage authorized in respect to actual fast tax write-offs.

BENDIX AVIATION CORP., Bendix Products Div., South Bend, Ind.
Military aircraft fuel systems—\$692,840 (60)

THE CLEVELAND PNEUMATIC TOOL CO., Cleveland, Ohio
Military aircraft landing gear—\$75,000 (40)

DAYTON AIRCRAFT PRODUCTS, INC., Ft. Lauderdale, Fla.
Military aircraft parts—\$80,262 (50)

DOUGLAS AIRCRAFT COMPANY, INC., El Segundo, Calif.
Military aircraft—\$115,846 (65)

DOUGLAS AIRCRAFT COMPANY, INC., Santa Monica, Calif.
Military aircraft—\$523,394 (65)

KEARFOTT COMPANY, INC., Little Falls, N. J.
Precision military aircraft instruments—\$109,095 (65)

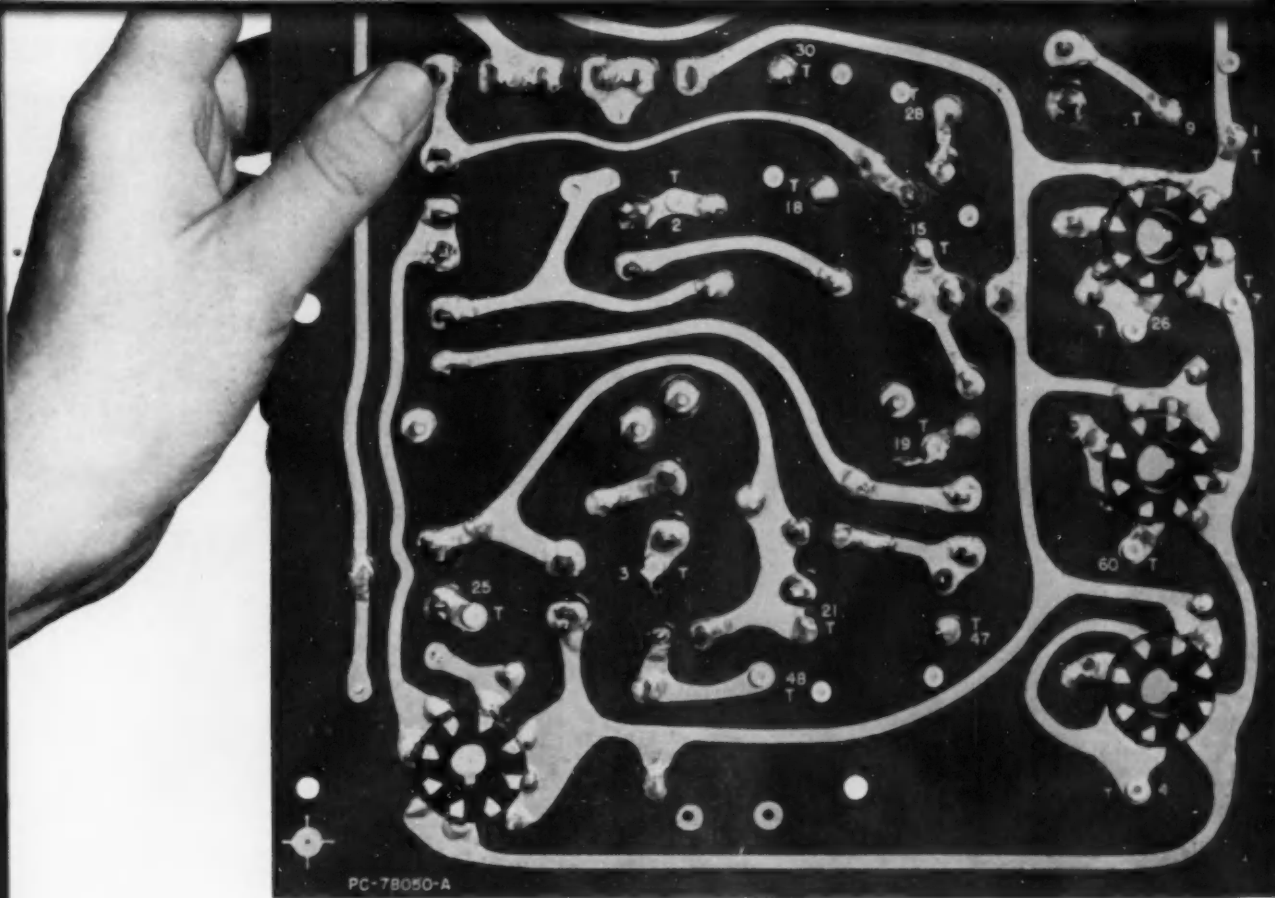
LOCKHEED AIRCRAFT CORP., Burbank, Calif.
Military aircraft—\$119,588 (60)
Military aircraft—\$370,391 (65)
Military aircraft—\$241,727 (65)

THE GLENN L. MARTIN CO., Baltimore, Md.
Military aircraft—\$460,500 (60)
Military aircraft—\$73,213 (65)

UNITED AIRCRAFT CORP., Hamilton Standard Div., Windsor Locks, Conn.
Military aircraft components—\$171,205 (60)

BOOKS...

AUTOMOTIVE FUEL, LUBRICATING, AND COOLING SYSTEMS, by William H. Crouse, published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. Price, \$5.75. This book treats comprehensively, in a single volume, the construction, operation, trouble shooting, servicing, and repair of fuel, lubricating, and cooling systems in the modern automotive engine. It is a practical manual designed to tell why components are designed in certain ways, how they operate, and how to test, service, and repair them. The emphasis is on complete coverage of these systems, and a chapter is devoted to each of the following topics: automotive fundamentals; fuel system fundamentals; fuel system operation; carburetor fundamentals; automotive carburetors; Diesel and LPG fuel systems; automotive engine fuels; diagnosing fuel system troubles; fuel system service; carburetor service; engine lubricating systems; lubricating system service; engine cooling system; and cooling system service.



Now, printed circuits advance resistance welding control

In the new Weld-O-Timer,* Westinghouse is first to show major gains in control simplification

Look how easy it is to follow the circuit of this new Weld-O-Timer control panel. Would you believe it replaces as much as 27 feet of scrambled wiring? Startling facts such as this only serve to show the extent of complete redesign represented in the new Westinghouse Weld-O-Timer. On the following pages, see the developments that . . .

- build more dependable performance
- increase welder protection
- expand operating efficiency
- achieve easier handling
- gain longer control life
- simplify maintenance

*Trade-Mark

J-21886-1

YOU CAN BE **SURE**...IF IT'S
Westinghouse





**Simplified, printed circuits . . .
fewer components . . .
build dependable performance**

Dependability of the new Weld-O-Timer control begins with the fact that it starts life with all circuit paths complete . . . patterned from a master circuit plan that is printed on the control panel. By eliminating the conventional tangle of hand-soldered connecting wires, the chance for human error in manufacture is prevented. The front side of each panel is punched and clearly marked with the type, rating and location for each component, further sim-

plifying the job of accurate assembly or replacement.

After assembly of components, a new Westinghouse dip solder method is used to obtain the tightest possible connection between component and circuit path. As panels are dipped in the solder bath at optimum conditions, no failing joints occur.

Design simplicity results, too, from an almost 50% reduction in tubes and other component parts in the Weld-O-Timer control panels.



LONGER LIFE
COMPONENTS

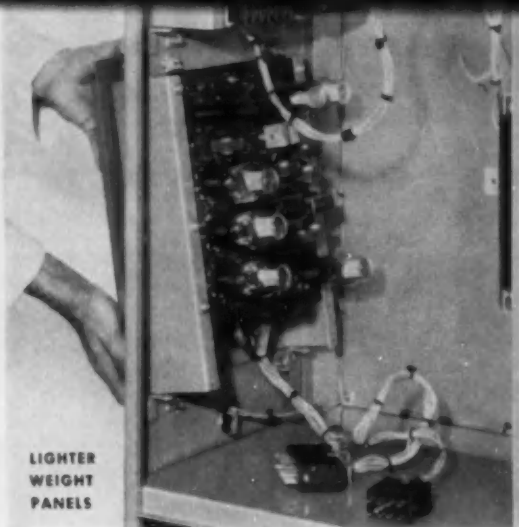
Longer life components assembled on each control panel are rated for heavy-duty industrial work. For example, 600-volt capacitors are used even though circuit voltage is only 150 volts. Such extra quality cuts replacement costs by 20%.

Lighter weight panels handle easily. Printed circuit construction of each control panel reduces weight by 30%. The time required to carry or handle panels, even in cramped quarters, is reduced. New heavy-duty industrial plugs make fast, safe connections.

Snap-on Ignitron tube thermostat improves welder efficiency and gives protection from high operating heat. It is snap mounted to an inner temperature registering plate and set to lock out the current should dangerous heat build up. For more efficiency, a similar thermostatic switch can be installed on the second Ignitron tube to regulate and conserve cooling water.

You can get all the facts on the new Weld-O-Timer from your Westinghouse sales engineer. Ask him for the new Weld-O-Timer book, B-6533, or write, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-21886-2



LIGHTER
WEIGHT
PANELS

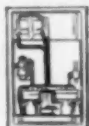


SNAP-ON
THERMOSTAT

YOU CAN BE SURE...IF IT'S
Westinghouse



FROM INDUSTRY'S MOST
COMPLETE LINE OF
INDUSTRIAL CONTROL



CONTROL COMPONENTS • MOTOR CONTROL • ELECTRONIC CONTROL • CONTROL SYSTEMS • NATIONAL SERVICES

Unique Lifting Device

A NEW method using nylon braid over rubber tubing, with metal fittings, has been developed to convert fluid pressure into force and mechanical motion. Currently being used for tubeless tire bead expanders, the development of Clevite Corporation's Research Center is expected to be used for small hoist operations and to actuate automation devices. The Center is also working on a special type for use as an inexpensive automobile window lift.

Called the Muscle by the company,

it has a stroke which is approximately 20 per cent of its length. In operation, gas or liquid under pressure enters the rubber tubing which acts as a bladder. As the bladder expands in diameter, it pushes against the walls of the nylon braid. The braid also expands in diameter, but because the individual fibers are not so elastic and remain about the same length, the braid shortens. The speed at which the gas or fluid enters the Muscle controls the speed of the stroke and the pressure used controls the length of the stroke.

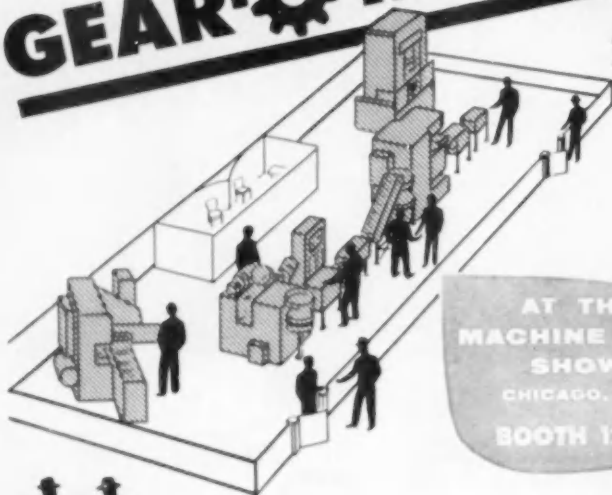
According to the company, the



These two illustrations show the Muscle as a hoist prior to being activated (top) and when air pressure is applied (bottom) to lift the weight.

Muscle has a maximum working pressure of 200 psi and a maximum force of 600 lb. It is not double acting.

See GEAR--MATION*



AT THE
MACHINE TOOL
SHOW
CHICAGO, ILL.
BOOTH 1220



—or, if you prefer, let us tell you the whole story right now—the story of how you can produce more gears and better gears—more splines and better splines—in less time—at lower cost.

Gear-O-Mation* will be shown in operation at the Machine Tool Show. All units are now in production and have been production-tested.

★Trademark



7171 E. McNICHOLS RD. • DETROIT 12, MICHIGAN, U. S. A.
IN CANADA: COLONIAL TOOL CO., LTD.

AUTOMOTIVE INDUSTRIES . . .

Is your News Magazine of
Automotive and Aviation
MANUFACTURING

How **C.P.C.**  replaced big gears like this  with little gears like this  

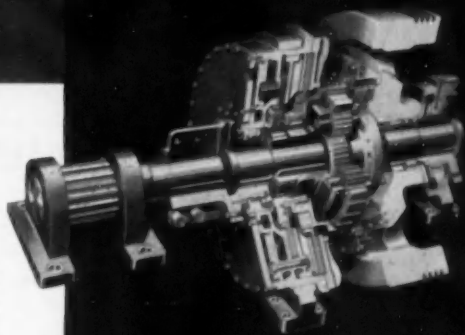
and got Out-of-this-World press performance with

planadrive



The Clearing Planadrive is a completely new type of underdrive press in which driveshaft speed is reduced so that it rotates at about one-third the R.P.M. of the flywheel. This new clutch is similar in principle to the Clearing Clearomatic clutch which is used to accelerate the cycling rate of mechanical presses. In the new Planadrive, *Clearing Productivity Consultants replaced the huge intermediate gearing ordinarily required in the press gear train with a set of planetary gears in the clutch itself.

As a result, the Planadrive clutch engages and disengages the driveshaft at a relatively slow speed so that the kinetic energy of the members to be started and stopped is comparatively low. This results in a low-inertia, cool running clutch and brake. Actually, the kinetic energy in the Planadrive clutch is only 25% in starting (and 12% in stopping) by comparison to a conventional drive. For this reason, the press can be operated at a far higher number of strokes per minute than can be obtained from a conventional press of comparable capacity.



The key to the out-of-this-world performance of the Planadrive press is the clutch shown in cutaway above. Planetary gearing in the clutch reduces driveshaft R.P.M. to approximately 1/3 of flywheel R.P.M.

Planadrive is another example of the kind of thinking Clearing engineers apply to a manufacturer's problem of producing more efficiently. If you're interested in Planadrive, or if you want the kind of thinking that developed Planadrive working for you, call on Clearing Machine Corporation.

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION DIVISION OF U. S. INDUSTRIES, INC.

6499 WEST 85TH STREET, CHICAGO 38, ILLINOIS • HAMILTON PLANT, HAMILTON, OHIO



Those three mice



...wouldn't get
to first base

Don't blindfold yourself to your own future. Know where you want to go, and you'll see how much better the opportunities are at Fairchild.

Engineers with an eye on their futures are looking to Fairchild for careers that lead to the top, because they know at Fairchild they'll work in the country's most advanced and active research centers. They'll be in right from the beginning on everything new that's happening in aviation.

Fairchild is looking now for experienced aerodynamists and designers. The right, wide-awake men will find unparalleled opportunity to move straight ahead as fast as their abilities let them.

Put yourself in a position with a future — at Fairchild. Send your resume today to Walter Tydon, Chief Engineer.


 ENGINE AND AIRPLANE CORPORATION
FAIRCHILD
Aircraft Division
HAGERSTOWN, MARYLAND

"where the future is measured in light-years"

Industry News

(Continued from page 166)

Welding Meeting and Show Prove Notably Successful

One of the largest and most successful national meetings and expositions ever held by the American Welding Society took place recently in Kansas City, Mo. Over 5000 technical management, and production men personnel were in attendance.

Featured at the National Spring Meeting were 13 technical sessions, where 40 papers on all phases of welding activity were presented. The Welding & Allied Industry Exposition, held concurrently with the spring meeting, was the largest in history. Engineers, designers, technical managers, metallurgists, and production men from throughout the U. S. and abroad visited the show to see the latest developments in welding equipment, accessories, and materials.

ASBE Announces Some Events Scheduled for Fall Meeting

Part of the program for its 1955 technical convention, to be held in Detroit from Oct. 26 to 28, has been announced by the American Society of Body Engineers. First-day sessions will cover such topics as sports and racing cars, testing, and new bodies.

On the second day of the convention, speakers will discuss newly developed products in the automobile industry, including the Continental car. Final sessions will deal with body materials, product planning, development of body engineers, and drafting contest awards.

Mexico Steps Up Campaign Against Illegal Vehicles

The Mexican Dept. of the Treasury is driving to legalize the status of some 40,000 automobiles imported into Mexico in irregular form. Owners will have up to six months to pay corresponding duties in installments.

Owners of the cars, which were imported into Mexico at the low 10 per cent duty by frontier residents and then sold to buyers in the interior, must pay outstanding import duties or face seizure of the vehicles. If necessary, some 400,000 passenger cars registered in Mexico will have their papers reviewed by officials to locate owners who refuse to pay the import duties.

(Turn to page 176, please)



How Holley's rolling laboratories test the fuel metering devices for tomorrow's cars and trucks



When a carburetor prototype or an important design change has proven its merit at Holley's "inside" research lab, it's sent to the world's toughest proving ground—the streets and highways of America.

Holley's inside research and development laboratory—one of the best equipped in the automotive industry—can tell only part of the story. Cold room, dynamometer, and air box testing simulate to a high degree the driving conditions a carburetor prototype will ultimately face. Even before these physical tests, an electronic computer—Holley acquired one of the first in the automotive industry—checks and tabulates design theory from drawing board specifications.

But ultimately, the most conclusive test is found on city streets, country roads and super highways.

Holley engineers frequently average 500 miles a day for ten days measuring a carburetor's performance in heavy traffic or on super highways.

The results of this concentration on research both "inside" and "outside" have helped to bring Holley equipped cars 5 sweepstakes champions in Mobilgas Economy Runs and 3 straight Heavy Stock Car winners in the fabulous Pan American Road Race.

HOLLEY
Carburetor Co.

FOR MORE THAN
HALF A CENTURY
—ORIGINAL EQUIP-
MENT MANUFAC-
TURERS FOR THE
AUTOMOTIVE IN-
DUSTRY.

11955 E. NINE MILE ROAD, VAN DYKE, MICHIGAN

Industry News

(Continued from page 174)

Stewart Made MAPI President; Other Officials Are Elected

Charles W. Stewart, Jr., was elected president of the Machinery and Allied Products Institute at its recent annual meeting. He will also serve as chairman of the Council for Technological Advancement, an affiliate organization of the Institute.

Five leading industrialists in the capital goods field were elected MAPI vice-presidents for the year which began July 1. They are: Robert W. Gillispie, chairman of the board, Jeffrey Manufacturing Co.; Alfred Iddles, president, Babcock & Wilcox Co.; Morehead Patterson, chairman, American Machine & Foundry Co.; Guy A. Wainwright, president, Diamond Chain Co., Inc., and Thomas H. West, president, Draper Corp.

Among the newly-elected members of the Executive Committee are: Geoffrey G. Beard, president, United

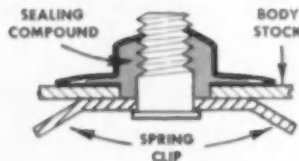
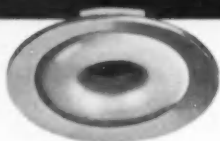
Engineering & Foundry Co.; Robert C. Becherer, president, Link-Belt Co.; R. D. Brizzolara, vice-president, American Steel Foundries; E. C. Bullard, president, The Bullard Co.; W. V. Casgrain, president, Mechanical Handling Systems, Inc.; Ralph F. Gow, executive vice-president, Norton Co.; Bruce F. Olson, president and general manager, Sundstrand Machine Tool Co.; Henry D. Sharpe, Jr., president, Brown & Sharpe Manufacturing Co.; Harold B. Smith, president, Illinois Tool Works; George Spatta, president, Clark Equipment Co.; Walter W. Tangeman, executive vice-president, Cincinnati Milling Machine Co.; and Brinton Welser, vice-president, Chain Belt Co.

Other Institute staff officers named at the annual meeting include Alexander Konkle, vice-president; George Terborgh, Research Director; and Charles I. Derr, secretary.

Here's the most effective, low-cost lock nut to Seal out Water, Dirt and Dust



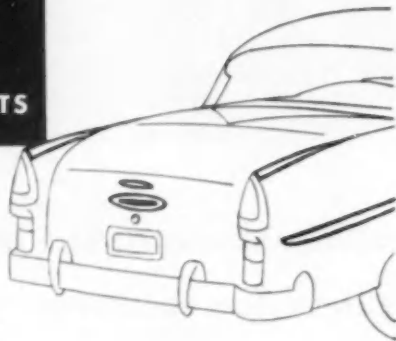
**SEALER TYPE
PALNUT**
Trademark®
WASHER LOCK NUTS



Stud Damage Reduced

Washer PALNUTS eliminate the common causes of die cast stud damage. The PALNUT single thread removes plating burrs while tightening. Thread engagement is high on stud, therefore studs need no threads at base and are stronger. Resilient spring steel washer base cushions the shock of power drivers on stud.

when fastening
emblems, moldings and handles
on rear deck, quarter panels
and rear fenders



The one-piece Sealer Type Washer PALNUT Lock Nut does the job of an ordinary nut, lock washer, flat washer and sealing unit. It costs less—assembles faster—holds more securely—offers more advantages than any sealer-type fastening method.

Resilient spring steel construction greatly eliminates stud damage or dimpling of body stock. Sealing compound completely seals around threads and stud clearance. Washer spans stud hole, can not chafe edges to cause corrosion.

The PALNUT Company
60 Cordier St., Irvington 11, N. J.

For full details and free samples
contact our Detroit office.
730 West Eight Mile Road, Detroit 20, Michigan
Telephone: Jordan 4-6087

Hupp, Perfection Move Step Closer To Merger

Purchase of stock in Perfection Industries, Inc., by three organizations signals another move in plans to merge the company with Hupp Corp. In addition to Hupp's purchase of 65,000 common shares of Perfection stock, the other parties have bought a combined 45,000 shares. The three groups now hold about 40 per cent of Perfection stock.

Canadian Vehicle Output Comparable to U. S. Boom

Canadian automobile companies are producing cars at a record rate. By mid-June, a total of 257,322 cars and trucks had been built, against last year's production of 246,000 vehicles at the end of June. Total production this year is expected to be over 400,000 cars and trucks, as compared with 350,000 units in 1954.

Dow Donation of \$400,000 To Aid Country's Schools

Industry's efforts in providing aid to higher education are pointed up again with the announcement that Dow Chemical Co. will allocate more than \$400,000 to various institutions throughout the country. Of the total amount, more than \$167,000 will go to 19 schools for current expansion and operating programs.

An additional \$133,500 will be distributed to 38 colleges and universities for the establishment of graduate fellowships and scholarships. The remaining \$140,000 will go to a number of schools for research work.

(Turn to page 178, please)

NATCO ENGINEERS

OVERCOME DISTORTION

DURING MACHINING

WITH

STRESSPROOF®

SEVERELY COLD-WORKED, FURNACE-TREATED
STEEL BARS

The Lead Screw Tapper Spindles of this Natco Three-way Holetapper required machining operations hard to combine without serious distortion.

The front end of each spindle had to be machined as a taper socket for collet application. When the driving keyway and the tool knockout elongated-splined-holes were machined, distortion caused out-of-round taper holes which would not receive the collet correctly.

The rear end of each spindle had to be machined as a driving spline shaft which slides under load. Since the diameter of the spline is relatively small in proportion to the shaft length, any attempt to heat treat caused distortion hard to correct by straightening.

And at the center of each spindle, an accurate lead screw had to be machined by a thread grinding operation. It was found that the finish was much more easily obtained when STRESSPROOF was used.

STRESSPROOF eliminated both the problem of the out-of-round taper holes on the front of each spindle . . . and the distortion of the driving-spline-shaft.

STRESSPROOF makes a better part at a lower cost.

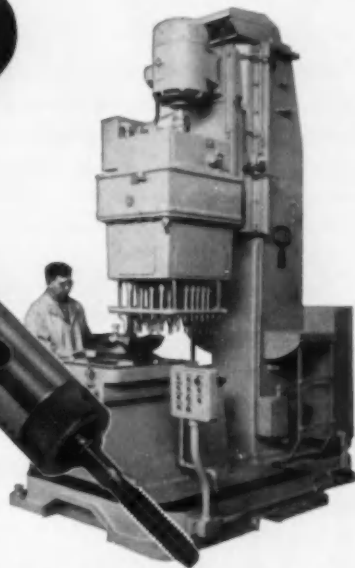
AVAILABLE FROM LEADING STEEL
DISTRIBUTORS COAST-TO-COAST



La Salle STEEL CO.

1438 150th Street, Hammond, Indiana

MANUFACTURERS OF AMERICA'S MOST COMPLETE LINE OF QUALITY COLD-FINISHED STEEL BARS



National Automatic Tool Co. has for many years used STRESSPROOF in the manufacture of important operating parts for this Three-way Holetapper, as well as for other Natco high-speed machine tools.



WRITE TODAY FOR
Helpful Data
Bulletin No. 15
"Improve Quality
—Cut Costs"

Keep your eye on Buckeye

and this
ALL-NEW
power-packed grinder—
weighs just 4½ lbs.!

You'll look a long while before you'll find a grinding job that can't be handled by one of these NEW Buckeye horizontal grinders! Plenty of power to handle a 6" wheel on heavy work . . . can be used with roll-type abrasives or wire brush, and will do a top-notch job with either . . . can even be used with a tool post holder for accurate work.

You'll like the built-in muffler that cuts down exhaust noise, yet has no external parts to add to tool diameter. You can adjust the exhaust deflector to any position in a full 360° circle. Steel case encloses tool at largest diameter, provides added protection, insures longer wear.

Maintenance on this tool is amazingly simple. Tool can be disassembled without any special tools, and all working parts are readily accessible for checking and servicing when necessary. Available in four speeds, 15,000 to 6,000 RPM. Capacities to 4" vitreous wheel, 6" organic wheel.

Catalog G-10 has the full story on these all-new Buckeye grinders, plus complete information on the most complete line of portable, air-powered abrasive tools available anywhere. Write—today—for your copy.



Buckeye Tools

CORPORATION

DIVISION 21 • DAYTON 1, OHIO

IN CANADA: Jay Manufacturing Co., Ltd., Galt, Ontario

producers of
the world's first
successful
rotary air tools

Industry News

(Continued from page 176)

Record Number of Vehicles Junked During Last Year

Vehicle scrappage in 1954 reached an all-time high for the third consecutive year. Last year, 3.5 million cars and 600,000 trucks were junked for a total of 4.1 million units compared with the previous record of four million in 1953.

At least two million more new cars were put on the road last year than the total of old cars scrapped. This would indicate that for every 35 cars junked, 55 new ones were registered.

Impact of High Car Output On Suppliers Is Indicated

An indication of the impact high automobile production has on business and employment of parts manufacturers, tire companies, and other suppliers is given by Chevrolet. T. H. Keating, general manager of the division, notes that Chevrolet is spending nearly \$17 million a month on supplies for three of its Detroit area plants alone.

In order to build 10,080 cars and trucks a day, as Chevrolet did recently, the division required about 33 million lb of gross steel supplies, seven million lb of iron, one million lb of non-ferrous metals, and 1.7 million lb of chemical materials. In addition, two million lb of agricultural, animal, and forest products are needed to maintain such a daily production rate.

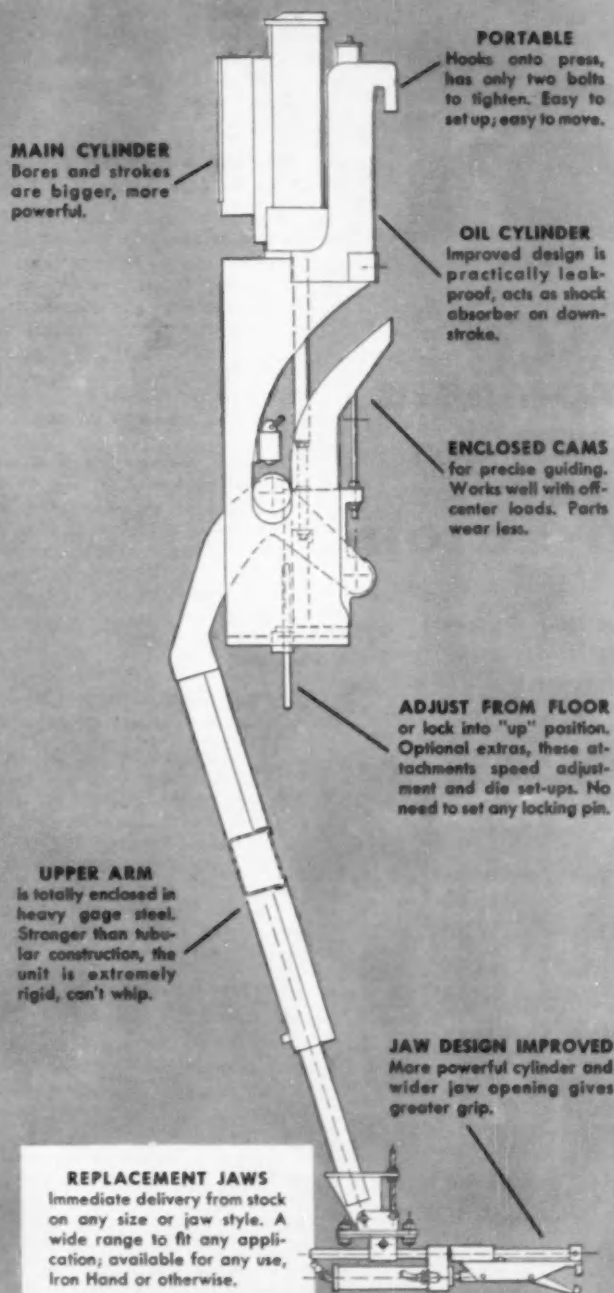
As for employment, the Chevrolet executive observed that it would take a plant employing 20,000 workers to provide steel for 10,000 vehicles a day. Another 10,000 workers would be needed to turn out tires for the same number of vehicles. Half of an automobile company's receipts normally go for purchase of materials and services from suppliers, Mr. Keating pointed out.

Replacement Parts Sales Up 16 Per Cent Over 1954

Automotive replacement parts sales continue at a high rate and the industry is estimated to be about 16 per cent ahead of a year ago. This rate is expected to slack off some before the year's end, but 1955 is expected to wind up about 10 per cent ahead of last year.

(Turn to page 180, please)

New 1955 Model Iron Hand is more rugged than ever



Redesigned for heavy-duty work, it takes today's tough jobs with ease

The new 1955 Model Iron Hand has been designed from the ground up for bruising daily double-shift operation: jaws are wider-opening and much stronger, cams more precise, and the frame more rigid. The new design makes it easier to install, easier to adjust, and a cinch to move from press to press.

And performance reports from the field prove that maintenance time—always negligible—has been slashed to the bone by the new design.

Whether you now operate a battery of Iron Hands, or are first considering them, you ought to study the design improvements in the new 1955 Models. For complete information, write

SAHLIN
ENGINEERING COMPANY, INC.
P. O. Box 289, Birmingham, Michigan

OVERHEAD ARMS • FLOOR TYPE UNLOADERS
TURNOVER, TRANSFER AND LOADING MACHINERY



Industry News

(Continued from page 178)

First Group of Technicians "Graduated" By Chrysler

An example of the automobile industry's continuous efforts to train personnel for key technical jobs is an experimental two-year educational program conducted jointly by Chrysler Corp., and Highland Park Junior College, Highland Park, Mich. The

first group of technicians was graduated under the program last month, and another will begin next September.

Participants in the program include persons who have more than a high school education but no college degree. Those qualifying are employed mainly in semi-professional work, such as laboratory technicians, technical clerks, and in various drafting jobs. The training program consists of alternate 10-week periods in the classroom and in practical work at Chrysler plants.

Shawinigan and Monsanto To Build Units in Mich.

Shawinigan Resins Corp. has announced plans to build a multi-million dollar plant at Trenton, Mich., to increase its production of Butvar—a polyvinyl resin base material used in the manufacture of safety glass. Monsanto Chemical Co. will build a plant on an adjoining site to convert Butvar into Saflex sheeting for safety glass manufacturers.

Shawinigan Resins is owned jointly by Monsanto and Shawinigan Products Corp. The new plants are expected to be in operation by the end of next year.

Mexican Automotive Producer To Go Into Production Soon

Diesel Nacional (DINA), newly organized Mexico City concern, expects to build internal combustion engines of various types, tractors, agricultural machinery, and automotive vehicles, including 12-ton city buses, freight trucks, etc. The plant is scheduled for late this year, and production of agricultural machinery and tractors is scheduled to begin next year.

However, the new line of Mexican-produced automobiles, under Fiat supervision, is not expected to come off assembly lines for another four years. Technical designs for reconstruction of automotive equipment at the Irolo plant of Diesel Nacional will be along the lines of Italian Fiat products.

Pace Corp. Granted New Contracts From Ordnance

Pace Corp. at Detroit will start work next October on new contracts that it was granted last month (June) by the Detroit Ordnance District. The two contracts, totaling \$3.2 million, include \$480,000 for facilities at the company's Memphis, Tenn., plant, and \$2.8 million for production of 155mm illuminating shells for the Army.

Caterpillar Looks for Sales Of About \$500 Million in '55

Backed by a big boom in the earth-moving equipment business, Caterpillar Tractor Co. is looking forward to sales of nearly \$500 million this year, or about \$100 million more than in 1954. The company is confident sales next year might even surpass the anticipated 1955 total. Caterpillar is in the midst of an expansion program that will give it a materially higher capacity in 1956.

(Turn to page 184, please)

new!



**FASCO
AUTOMATIC
RESET
MOTOR
PROTECTOR**

Positive safeguard against overloads and short circuits in low voltage Electrical Equipment

This Fasco No. 1133 Automatic Reset Motor Protector recently perfected, is specifically designed as a "built-in" circuit breaker to protect motors used in actuating seats, window lifts, windshield wipers, etc. And remember . . . this same Circuit Breaker can also be used to protect many other electrical circuits.

Here's another example of Fasco service to the Automotive Industry and reason why leaders in the field find it pays to CONSULT **FASCO** . . . FIRST!

AUTOMOTIVE DIVISION

FASCO

INDUSTRIES, INC.

ROCHESTER 2, NEW YORK

DETROIT OFFICE—12737 PURITAN—PHONE: UN 17476

Tube Makers Please Note —

A tube mill represents a major investment. Good business practice dictates that before you invest—you should investigate.

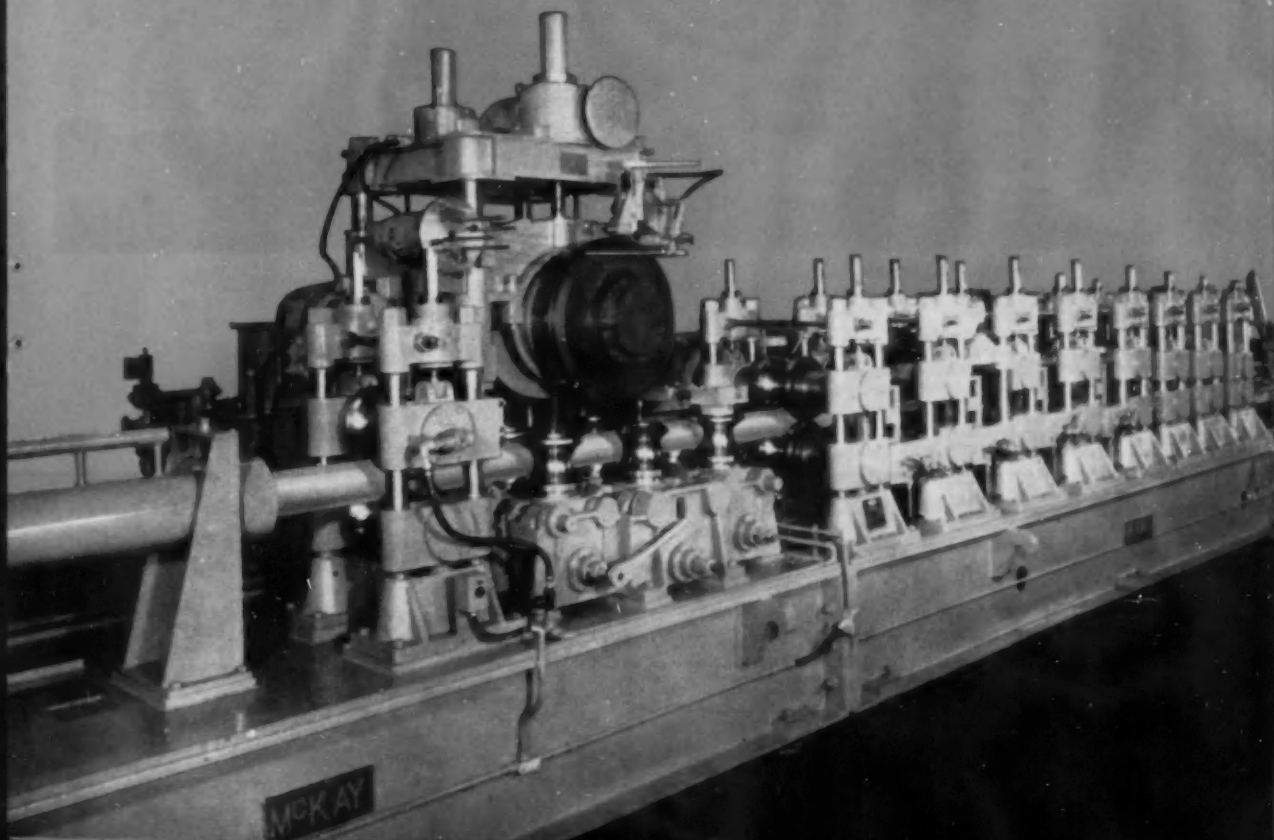
We here at McKay believe we build the finest tube mill made today. We could point to many features that support this belief. However, these features are all a part of our determination to constantly improve the product, and to *never substitute for quality.*

Experience has proved the most expensive single item in tube mill operation is *down time*. This time lost can quickly mount into thousands of dollars — making any savings in the initial cost of equipment trivial by comparison.

Every McKay Tube Mill is designed to deliver the ultimate in **PERFORMANCE, PRECISION, RUGGEDNESS** and **SAFETY**. Compare! Investigate thoroughly before you buy and we feel sure you'll specify **TUBE MILLS** by **McKAY**.

THE MCKAY MACHINE COMPANY, Youngstown, Ohio

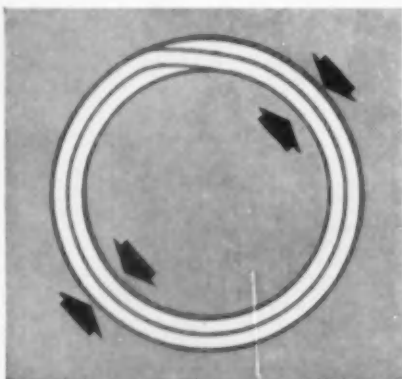
Designers and builders of modern tube making, forming, sizing, reducing, welding and cut-off equipment.



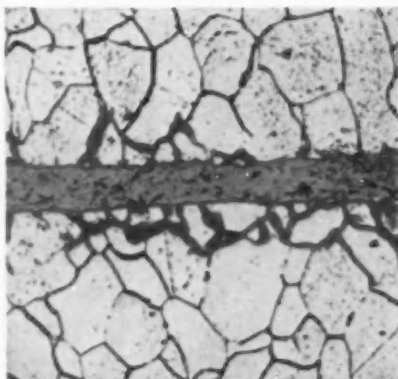
Only Bundyweld steel tubing

Here's why Bundyweld STEEL Tubing is used on 95% of today's cars

The illustrations below reveal why Bundyweld is specified by automotive manufacturers where strength and durability of tubing are essential. Bundyweld is the only tubing double-walled from a single metal strip. This exclusive process gives Bundyweld superior strength properties. Yet, because of the conditions under which Bundyweld is brazed and cooled, it is uniform and easy to fabricate.



With Bundyweld's beveled edges and single close-tolerance strip, there's no inside bead. The tubing is uniformly smooth, both inside and out. It fabricates easily; can be bent to short radii. Copper coating, inside and out, facilitates soldering and brazing operations.



This view of Bundyweld's copper bond (enlarged 300 times) shows how the copper actually alloys with the steel . . . through 360° of wall contact. That's the secret of Bundyweld's outstanding resistance to high pressure and vibration fatigue.



WHY BUNDYWELD IS BETTER TUBING



Bundyweld starts as a single strip of copper-coated steel. Then it's . . .



continuously rolled twice around laterally into a tube of uniform thickness, and



passed through a furnace. Copper coating fuses with steel. Result . . .



Bundyweld, double-walled and brazed through 360° of wall contact.



NOTE the exclusive Bundy-developed beveled edges, which afford a smoother joint, absence of bead, and less chance for any leakage.

can take punishment like this!



When automotive manufacturers attempt to build a hundred thousand miles into their cars, they know they must use only the highest quality parts. That's why Bundyweld STEEL Tubing is used in 95% of today's cars, in an average of 20 applications each. Only STEEL tubing is tough enough, rugged enough to take constant wear and tear.

Extra-strong Bundyweld Tubing is specified for

hydraulic brake lines, to assure safe stops; for oil lines, to save costly repairs; for gasoline lines, to assure leakproof performance; for push rods, to produce more powerful overhead valve engines.

Backed by expert technicians, Bundy offers advanced fabrication facilities and prompt, dependable delivery. Let us help you with your tubing problems. Write today for additional information.

BUNDYWELD TUBING®

DOUBLE-WALLED FROM A SINGLE STRIP

Bundy Tubing Distributors and Representatives: Cambridge 42, Mass.: Austin-Hartings Co., Inc., 226 Binney St. • Chattanooga 2, Tenn.: Pairson-Deakins Co., 823-824 Chattanooga Bank Bldg. • Chicago 32, Ill.: Lapham-Hickey Co., 3333 W. 47th Place • Elizabeth, New Jersey: A. B. Murray Co., Inc., Post Office Box 476 • Los Angeles 58, Calif.: Tubosales, 5400 Alcoa Ave. • Philadelphia 3, Penn.: Ruten & Co., 1717 Sansom St. • San Francisco 30, Calif.: Pacific Metals Co., Ltd., 3100 19th St. • Seattle 4, Wash.: Eagle Metals Co., 4755 First Ave., South • Toronto 5, Ontario, Canada: Alloy Metal Sales, Ltd., 161 Fleet St., E. • Bundyweld nickel and Monel tubing are sold by distributors of nickel and nickel alloys in principal cities.

GEAR PROBLEMS?

—Check
with

FAIRFIELD!

IF you use gears in the product you make, we believe it will pay you, as it has others, to become acquainted with FAIRFIELD—the place where fine gears are produced to meet your specifications EFFICIENTLY, ECONOMICALLY! Fairfield's production facilities are unexcelled for making all kinds of accurate, automotive type gears such as are now finding wide use in all branches of industry: for Tractors, Trucks, and Buses . . . for Agricultural Implements . . . for Machine Tools. Ask for latest literature describing Fairfield's facilities. *Your inquiry will receive prompt attention.*

Fine Gears Made to Order

SPUR GEARS—Straight, helical, and internal. Sizes from 16 pitch, 1½" dia., to 1½ pitch, 36" dia.

HERRINGBONE—(Fellows Type). Sizes from 1½" to 15".

SPIRAL BEVEL—Sizes from 16 pitch, 1½" dia., to 1½ pitch, 28" dia.

STRAIGHT BEVEL—Sizes from 16 pitch, 1½" dia., to 1½ pitch, 28" dia.

HYPOID—Sizes from 1½" to 28" dia.

ZEROL—Sizes from 16 pitch, 1½" dia., to 1½ pitch, 21" dia.

WORMS AND WORM GEARS—Worms to 7" dia. Worm gears to 36" dia.

SPLINED SHAFTS—Lengths to 52". Diameters from 1" to 6".

DIFFERENTIALS—10,000 to 300,000 inch pounds capacity.

Note: All of the sizes above are approximate.



**FAIRFIELD
MANUFACTURING CO.**

2203 South Concord Road • Lafayette, Indiana

Ask for interesting,
illustrated bulletin.



Industry News

(Continued from page 180)

AMA Points Out Boom In Car Wash Business

A study by the Automobile Manufacturers Association reveals the rapid growth of the car washing business during recent years. Although relatively new undertakings, car "laundries" last year took in a whopping \$120 million from about 100 million customers.

Today there are about 2000 car washing establishments in the country, compared with about 50 in 1945 with a majority of them capable of handling upward of 1000 cars daily. Detroit leads the country with 200 car laundries; New York is next with 150; and Los Angeles is third with 135, according to AMA.

Two-Tone Hues on Cars Date Back to WW I

Like many other "innovations" on new cars in the past several years, two-tone color combinations, requested by a majority of the car buyers, are not new. W. R. Milner, Pontiac body engineer, notes that twin-hued cars date back to World War I and that Pontiac produced an orange-blue model in 1929. Of course, the "bright" colors used in the past would appear quite dull by today's standards.

Milner recalls that dark colors—black, grey, green and blue—were most popular in 1924, and only 15 years ago half of the cars, turned out by the industry, were black. Today, black cars represent only a small percentage of total industry production. Even black cars are not as black as they once were, Milner explains, because the exterior is 70 per cent black paint, 30 per cent chrome and glass.

Desires and trends, established by automotive salesmanship, are attributed for the upswing in two-tone paint combinations, which started reaching new popularity in 1950. Although the pastel shades have been in vogue since the turn of the century, stylists in the past were not so liberal in their use as today.

Sharp Rise Seen In Number Of Two-Car Owners By 1960

Charles F. Seyffer, assistant general sales manager of the Ford Div. of Ford Motor Co., predicts that the number of two-car families will increase by 70 per cent in the next five years. It will be accompanied by an increase in the percentage of persons buying cars, Mr. Seyffer forecasts.

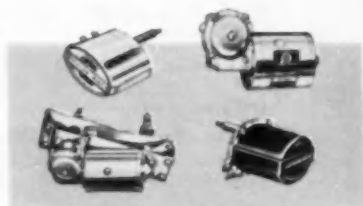
**BAD WEATHER
PUTS DRIVERS**

behind the 8 ball



**UNLESS THEY'RE EQUIPPED WITH
AMERICAN BOSCH
CONSTANT ELECTRIC ACTION
WINDSHIELD WIPERS**

Car and Truck drivers rack up more accident-free miles, even in the toughest weather, when they have constantly clear vision with American Bosch *Electric* Windshield Wipers. Regardless of speed or load, on up-grades and during acceleration, American Bosch *Constant Electric Action* is steady and dependable. Independent of engine vacuum, it eliminates stuttering, stalling blades—helps keep drivers in the clear and out of trouble on the road.



DUAL & SINGLE TYPES
For 6-12-24 Volt Systems. For Cars,
Trucks, Tractors, Buses and Boats.

American Bosch Electric Wipers are in wide use as original equipment. There are Dual and Single types, models for large-size arms and blades up to 20" in length—dependable Windshield Wipers with the heavy duty construction that guarantees years of trouble-free service.

American Bosch Electric Windshield Wipers are today's positive answer to good vision in bad weather, and they offer a keen, sales-active feature for your vehicles. Ask for complete specifications. American Bosch, Springfield 7, Mass. A Division of American Bosch Arma Corporation.

AMERICAN BOSCH



**Automotive and
Aviation Magnets**



**Generators and
Regulators**



**Components for
Aircraft Engines**



**Small
Electric Motors**



**Electric
Windshield Wipers**



**Diesel Fuel
Injection Equipment**

MEN in the NEWS

(Continued from page 110)

Gar Wood Industries, Inc.—**Harold H. Hippler** is now general sales manager.

Aluminum Co. of America—**Harry L. Smith, Jr.**, has been elected a sales vice-president.

Deles Products Div., General Motors Corp.—**James A. McNamara** has been appointed comptroller.

Chrysler Corp.—**Otto W. Franke** is now manager of the new Central Production Engineering Dept.

Chrysler Corp., Defense Operations Div.—**Clifford R. Carson** has been made manager of the Process and Methods Dept.

Shakeproof Div., Illinois Tool Works—**Frank Machac** has been promoted to plant superintendent.

Metal & Thermit Corp.—**H. D. McLeese** has been appointed general sales manager, and **J. E. Stareck** has been named director of research.

Rochester Products Div., General Motors Corp.—**Charles C. Brandon** has been appointed production manager.

Marion Power Shovel Co.—**Robert Campello** has been appointed sales manager.

Triplex Screw Co.—**Frank L. Sonnenman** was named division manager.

Eclipse Machine Div., Bendix Aviation Corp.—**James W. Mason** has been advanced to general superintendent of manufacturing.

Marquardt Aircraft Co.—**Mathias Klein** has been appointed chief manufacturing engineer.

Chrysler Corp.—**Norman R. Reno** has been named works manager of the Marine & Industrial Div.

Mercury Div., Ford Motor Co.—**T. Jack Henry** has been promoted to assistant general sales manager, and **J. J. Szeregyi** has been appointed assistant advertising manager.

General Motors Corp.—**John W. Reed** has been appointed regional public relations manager in Detroit, succeeding **Gaylord M. Coffin** who has been named public relations manager for GM in Cleveland. **Mr. Coffin** succeeds **Joseph E. Chope**, who has been appointed to GM's Committee for Educational Grants and Scholarships. **Harry L. Blair** was chosen public relations manager of the new Los Angeles region; **Herbert P. Grenda**, regional public relations manager at Kansas City, Mo., succeeding **Mr. Blair**; and **Andrew V. O'Keefe**, regional public relations manager in Dallas, Texas.

MoPar Div., Chrysler Corp.—**Samuel J. Wall** has been named general sales manager.

Dodge Div., Chrysler Corp.—**D. A. Geil** is now director of distribution and special equipment-trucks.

Lyon, Inc.—**George A. Lyon, Jr.**, was elected president and **G. Albert Lyon, Sr.**, was named chairman of the board.

De Havilland Engine Co., Ltd.—**A. F. Burke** has been elected chairman of the board.

Worcester Pressed Steel Co.—**John E. King** has been appointed sales manager, and **Folke A. Erickson** became assistant sales manager.

Micromatic Hone Corp.—**Don S. Connor** has been elected general manager; **William H. Harris, Jr.**, assistant general manager; and **R. G. Ellis**, chief engineer.

Polarad Electronics Corp.—**Louis Stark** has become general manager.

(Turn to page 200, please)



RUGGED ACCURATE

DETROIT "Vernatherm" CONTROLS

...for BIG Engine Cooling!

"Vernatherm" means a solid-charged thermostat which will take all the punishment that big engines and rough duty can give it, and give positive, precise coolant control indefinitely!

These thermostats were pioneered by Detroit Controls Corporation to meet the requirements of modern pressurized cooling systems. They have provided the answer to a great number of tough problems on Diesel, heavy-duty gasoline and jet engines. "Vernatherm" controls might be the solution to a situation in *your* engines... Call on DETROIT sales engineers for test data and actual results in the field... or write for Bulletin 213 which gives basic data on "Vernatherm" controls and their function in modern engine design.



DETROIT CONTROLS CORPORATION

8900 TRUMBULL AVE. • DETROIT 8, MICHIGAN

Division of AMERICAN RADIATOR & STANDARD SANITARY Corporation

Representatives in Principal Cities

Canadian Representatives:

RAILWAY AND ENGINEERING SPECIALTIES, LTD.,
Montreal, Toronto, Winnipeg.

AUTOMATIC CONTROLS FOR REFRIGERATION

AIR CONDITIONING • DOMESTIC HEATING • AVIATION • TRANSPORTATION • HOME APPLIANCES • INDUSTRIAL USES

SERVING HOME AND INDUSTRY

AMERICAN STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE
BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

when you can't afford to be wrong...



Hydrostatic Tube Testing Machine for testing 3'-0" to 5'-0" lengths of

tubing up to 2½" O. D. under pressures ranging up to 6,000 psi.

Used specifically for automotive propeller shaft tubing, but has many other uses. Average production rate is 250 tubes per hour. This is only one of many pieces of hydraulic equipment made by R. D. Wood for the automotive and aircraft industries.

... Choose your machine from the line that has been industry's standard since 1803. In more than 150 years, R. D. Wood has never built an inferior piece of equipment. Every R. D. Wood product is the result of minute attention to details of design, excellent materials, painstaking craftsmanship. Users of R. D. Wood equipment—throughout industry—translate these features into over-all efficiency, operating speed and ease, and production economies. Write for engineering information—without obligation—on R. D. Wood presses for the automotive and aircraft industries.



R. D. WOOD COMPANY

PUBLIC LEDGER BUILDING • PHILADELPHIA 5, PENNSYLVANIA
Representatives in Principal Cities



MAKERS OF HYDRAULIC PRESSES AND VALVES



FIRE HYDRANTS



CAST-IRON PIPE



GATE VALVES



GAS PRODUCERS



ACCUMULATORS





(Continued from page 110)

The Hydraulic Hoist and Steel Dump Body Manufacturers Association has affiliated with the Truck Body and Equipment Association to form the Industry Div. of the latter.

Lockheed Aircraft Corp. has unveiled a new Super Constellation designed for use as either a cargo transport or a luxury passenger plane.

Mexico is producing five and nine-hp engines at the San Pedro Jalisco plant of Motores Nacionales, S.A.

William Brand & Co., Inc., has dedicated a new plant at North Windham, Conn., to manufacture plastic insulated wire and cable electrical insulating tubing.

Nopco Chemical Co. has established a new Plastics Div. . . . Ampex International has been formed as a new division of Ampex Corp.

Towmotor Corp. has cut prices of its power steering and automatic drive units.

Aircraft Div. of Ledkote Products Co. is now forming contoured stampings for custom bus and trailer bodies, farm equipment, and automotive assemblies.

Fairchild's C-123B assault transport plane will be equipped with a new lift measuring instrument developed by Safe Flight Instrument Corp. . . . New automatic pilot, manufactured by S. Smith and Sons, will soon be standard equipment for British airliners.

Dayton T. Brown Corp. is now offering a new Airvan 126 aluminum parcel delivery truck body for stripped Ford P-350 chassis.

Westinghouse Electric Corp. is releasing soon a new motion picture, entitled "A Dawn's Early Light," which reveals historic scenes of atomic engine construction.

Birdsboro Steel Foundry & Machine Co. has acquired Engineering Supervision Co.

Automatic Brake Div. of Hemphill, Inc., Gowanda, N. Y., has introduced a new automatic brake for cars, trucks, and buses that is claimed to reduce stopping distances as much as 60 per cent. . . . Trice Products Corp. has developed a new vacuum windshield wiper motor with two ranges of operation.

Pennsylvania Salt Manufacturing Co. has moved its executive offices to Three Penn Center Plaza, Philadelphia 2, Pa.

Westinghouse Electric Corp. has announced plans to construct a multi-million dollar atomic reactor center.

Houdaille-Hershey Corp. has obtained manufacturing rights to a new high-pressure pump for operating hydraulic equipment on aircraft.

Offices of the Pacific Automotive Show are now located in the Petroleum Bldg., 714 W. Olympic Blvd., Los Angeles 15, Calif.



**a motor
that matches
the quality
of your product**

You are assured motor performance on a level with the excellence of your product, when you use a Lamb Electric Motor.

Outstanding motor quality and uniformity are the result of our high degree of specialization in both equipment and methods, combined with rigid process control.

Your staff and ours working together can give your product the dependability and long life that result from this standard of motor quality.

**THE LAMB ELECTRIC COMPANY
KENT, OHIO**

In Canada: Lamb Electric — Division of
Sangamo Company Ltd. — Leaside, Ontario



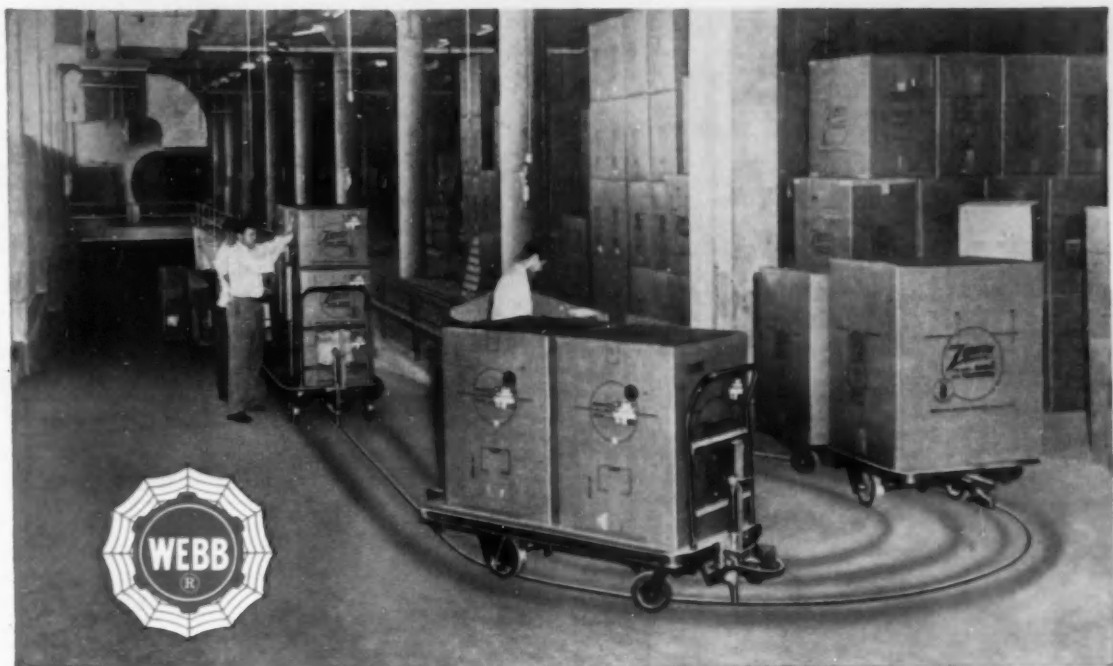
For motor-driven
office equipment.

Signal corps trans-
mitter blower motor.

Lamb Electric
SPECIAL APPLICATION
FRACTIONAL HORSEPOWER **MOTORS**

JERVIS B. WEBB

CONVEYOR ENGINEERING, MANUFACTURE, INSTALLATION and AUTOMATION



A TOWVEYOR THAT RUNS FROM FLOOR TO FLOOR?

Yes, for the first time, here is a Towveyor installation that also travels up and down concrete ramps, providing a smooth and constant flow of materials between floors. This modern Towveyor installation is the backbone of materials handling in this huge plant. Nearly 4,000 feet of Towveyor track winds its way through the various departments, bringing cabinets and other materials in, and removing finished TV sets to storage or shipping.

The Towveyor system consists of a motor driven endless chain that travels in a trough in the floor. Material is carried on 750 tow trucks. Each truck is equipped with a tow pin which is manually lowered into a narrow continuous slot in the floor to engage the Towveyor chain. Trucks are disengaged from chain by raising tow pin. Tow pin is spring locked in the up position and locked in a slot in the

down position for positive safety on both flat and ramp travel of tow trucks.

This efficient Towveyor system provides faster and better regulated flow of cabinets from receiving docks to warehouse. Finished radios and television sets are smoothly moved from final assembly to shipping. Picture tubes, component parts and even corrugated cartons are carried in a carefully coordinated manner to their proper stations. Maximum daily capacity of system is 10,000 cabinets delivered to warehouse and 10,000 finished sets to shipping.

Webb engineering ingenuity and design experience can also provide a better answer to your materials handling problems. Up and down, and all around your plant, Webb conveyors engineered to your specific needs are best.

Visit us at "The Production Engineering Show" — Navy Pier, Chicago • September 6 to 16, 1955 • Booth 518

Write to us on your company letterhead and we will be happy to place your name on the Webb mailing list to receive factual technical information on conveyor installations, case history reports, and new product literature.

JERVIS B. WEBB CO.

Specialists in Custom Conveyor Systems

8937 ALPINE AVENUE • DETROIT 4, MICHIGAN

Offices and Representatives Throughout The World • FACTORIES: Detroit • Los Angeles • Hamilton, Ontario

Motor Vehicles at Japanese Show

(Continued from page 163)

in-line engine with a bore of three in. and stroke of 3½ in.

Several years ago some makers tried three-wheeled closed body passenger cars. One was the Mizushima and the other was the Daihatsu Bee. This year, however, these three-wheeled passenger cars disappeared from

the show, except for a midget-type cabin scooter manufactured by Fuji Motor Co. This rear-engine car has two wheels in the front with a rod-type steering bar, instead of the usual steering wheel or handle. Powered by a 5.5-hp engine, it has a body of plastic monocoque construction and weighs 320 lb.

Motorcycles, Scooters, Motorbikes

There are about 50 motorcycle manufacturers in Japan which produce some 114 types of machines. Rikuo's 73 cu in. model and Meguro's 40 cu in.

unit develop 28 and 29 hp, respectively. Honda's Dream motorcycle is a lightweight unit with an ohv, 13 cu in. engine. The Lylac 21 cu in. and Baby Lylac 5.5 cu in. are also both very practical machines.

Six manufacturers produce 44,000 scooters annually. These usually have 10 to 15 cu in. four-stroke engines.

Six types of motorbike engines were displayed. Among them was the B.S. engine which has a displacement of 2.3 cu in. and develops 0.85 hp at 4000 rpm.

Among the products displayed at the stands for parts, accessories, and allied products, the Okamura torque converter was of interest. The Kayaba shock absorber also attracted much attention.

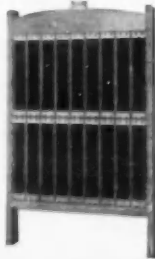
YA Radiators



...assure **DEPENDABLE POWER** on this heavy duty crane and shovel

It takes a rugged crane and shovel to dig rocks in the building of America's turnpikes . . . and equipment such as this demands heavy duty radiator equipment. The machine illustrated is equipped with YA Sectional Cast Tank Radiators that can stand up under continued operation. Being of sectional design, they permit easy replacement of sections right on the job, with a minimum loss of time. Call in a Yates-American representative to work with your engineers in planning the correct radiator equipment to fit your specifications.

California Representative: E. E. Richter & Son, Emeryville, Calif.



Yates-American
REBUILT • WISCONSIN

BRANCH OFFICES: CHICAGO, CLEVELAND, NEW YORK, NORTH
CAROLINA, PITTSBURGH, PHOENIX, PORTLAND, OREGON

BOOKS . . .

SERVOMECHANISMS AND REGULATING SYSTEM DESIGN, VOL. II, by Harold Chestnut and Robert W. Mayer, published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price, \$8.50. This book states the problems met in the design of regulators and feedback control systems and develops methods for their solution. Although an analytical approach is employed, the emphasis has been placed on practical design. It also provides an early chapter on the measurement of quantities; treats thoroughly the means for establishing design specifications; develops techniques for handling the effects of extraneous signal inputs; discusses the factors influencing the selection of elements for power and stabilizing sections; presents amplifier design factors to minimize gain changes, drift, and changes in tubes and other components; describes all a-c servomechanism design; stresses linearization techniques and non-linear operation for large input signals and deliberate parameter changes; and includes many illustrative problems, all adopted for actual design projects.

GENTLEMEN, START YOUR ENGINES, by Wilbur Shaw, published by Coward-McCann, Inc., 210 Madison Ave., New York, N. Y. Price, \$5.00. Here is a book, first, for those millions of automobile owners who realize that the purpose of the automobile is to get somewhere fast now, and faster next year; and it is a book for racing enthusiasts of all ages, from the hot-rod youths to grown-up men. This is the autobiography of Wilbur Shaw, one of America's most colorful sports figures before his death in 1954 in, ironically, an airplane crash. It is an exciting and human revelation of a vivid personality adventuring in one of the most stirring occupations known to man. Above all, there is the story of a man's demanding search for competition against any and all odds. For 35 years Wilbur Shaw had sought speed and danger, and found both in automobile, airplane, and motorboat racing. In addition to its excitement, the book shows the reader the inner secrets of the motor car industry and tells of its constant efforts to improve its products.



STEEL MUSCLED PROTECTION

against sudden stops



The split-second deceleration of a panic stop exerts many thousand foot-pounds of pressure against protective seat belts. A belt failure under such conditions would mean serious injury—even sudden death to the car's passengers.

Vital to the belt's holding qualities is its anchorage to the car frame, for which purpose leading manufacturers employ a wire cable assembly.

Anticipating greater highway speeds and industry needs for *unique* and *absolutely* reliable cable assemblies, Bergen Wire Rope Company research engineers concentrated their extensive experience on this problem—successfully developing new designs and advanced production techniques to meet volume requirements.

The ruggedness and maximum strength of these cable assemblies is assured by rigid metallurgical tests for quality, uniformity and other *critical* factors . . . special terminal fittings offer extra safety factors due to Bergen's *rotary swaging* which reduces metal fatigue and *always* insures perfect alignment.

Through specialized experience, significant manufacturing skills and quality materials, Bergen wire cables, slings and assemblies have become renowned for dependability and economy . . . specify the best . . . specify Bergen

Solve your design problems the easy way . . . write for Bergen automotive literature today!



BERGEN

WIRE ROPE COMPANY

72 GREGG ST. LODI, N. J.

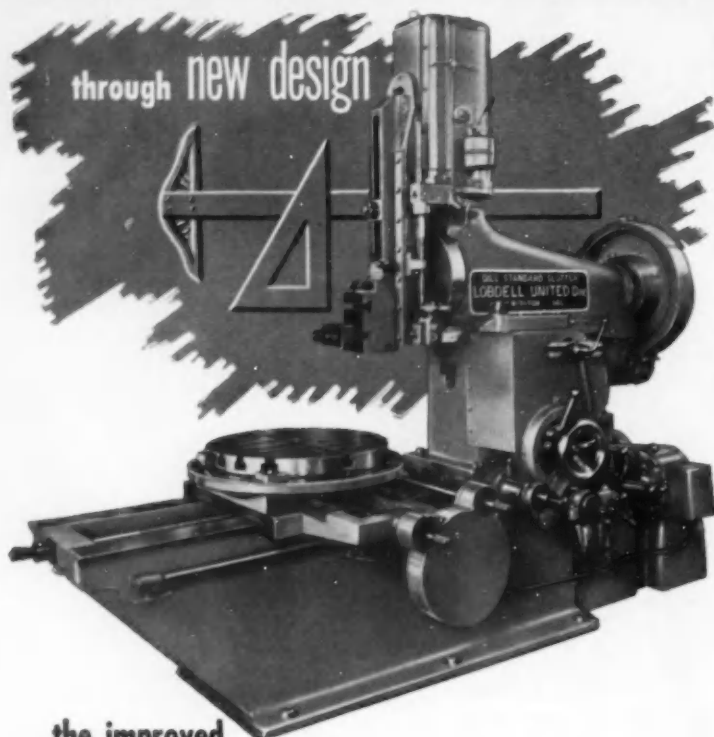


SERVING THE LEADERS OF INDUSTRY

©1961

more speed, easier operation + minimum maintenance

through new design



the improved

LOBDELL DILL SLOTTER

... offers these outstanding features

- A "One Tool" Machine Shop . . . the LOBDELL DILL SLOTTER is truly versatile . . . easily handles large and small work.
- . . . cuts grooves, keyways, splines, large gears, both internal and external, regular and irregular surfaces.
- Machines large and bulky pieces too awkward to handle on any other machine.
- DILL TRAVELING HEAD SLOTTER available in 2 models: Universal (swiveling head) and Standard (non-swiveling head).
- Traveling Head on both models feeds tools to the work or clamps rigidly in any position with work fed to the tool . . . power and hand feed.
- The Universal Head swivels for angular surfaces, with 15° adjustment either side of center.
- Feeds and Stroke are positive . . . and, can be supplied with constant or variable speed motor drive.
- Write for the new LOBDELL DILL SLOTTER Bulletin.

LOBDELL DIVISION

UNITED ENGINEERING AND FOUNDRY COMPANY

1836

WILMINGTON 99, DELAWARE

1955

NEW ACCESSORIES

Lighter Lift

The Anthony Teleramic head lift dump body offers a combination of light weight and a front mounted hoist which puts more weight distribution on the truck front axle.



The head lift body utilizes the body head as the lifting structure to get greatest lifting leverage. It is possible to get up to 700 lb of additional legal payload in three to five yd dump body, and even greater payload benefits in the larger heavy-duty models, the company states. *Anthony Co., Streator, Ill.*

Lift Gate

The Elevating End-Gate is designed for installation on the rear of a 1½-ton or larger truck, or semi-trailer, and lifts or lowers loads up to 2000 lbs. All end-gate operations—opening, lowering, raising and closing—are hydraulically actuated by single lever controls, one located on each side of the truck, which operate one valve that controls all movements. A single, double-acting cylinder powers all operations. The control valve stops and holds the platform at any height when the control lever is released. An overload valve prevents raising or lowering the platform when overloaded, and a safety valve prevents closing the End-Gate when the platform is loaded. Double safety latches lock the gate at truck bed level to eliminate the possibility of accidental release. *Gar Wood Industries, Wayne, Mich.*

faster dis-assembly

no re-alignment problems



O-M

has the KEY
to simpler
cylinder maintenance

O-M Cylinders save down-time expense and headaches when it comes time to replace packing and seals. **SPECIAL INTERNAL LOCKING KEY** is released by rotating end cover, which allows quick, easy removal of cover and rod. And re-assembly is fool-proof. There's only one way to take an O-M Cylinder apart, one way to put it together. Key controls positioning . . . locks cover securely. No threads to strip. No tie rods and end caps to bolt together. No time-consuming alignment and adjustment problems.

O-M Air and Hydraulic Cylinders are available in a complete range of sizes (1½ to 8" bores), with standard, 2 to 1 or oversize rods. All steel construction with bearing bronze. Completely interchangeable parts. *Immediate delivery on many sizes.*



mail coupon now!

for **FREE** catalog, complete set of ½-scale templates, showing all cylinders, mounts and mounting brackets.

fit where others won't



ORTMAN-MILLER MACHINE COMPANY

17 143rd Street, Hammond, Indiana

☐ Have representative call ☐ Send latest catalog ☐ Send ½-scale templates

Name _____ Position _____

Company _____

Address _____

City _____ Zone _____ State _____

Maintaining the Automated Plant

(Continued from page 73)

fits to be derived from this venture. His immediate reactions served as a determining factor in attaining the objective in a reasonably short period of time.

All time sheets, hourly forms and requisitions must pass through the cost control unit for complete review. This information is then dispatched to the IBM section where the report is

prepared for machine cost record posting.

This information in turn may be used for highlighting recurring weaknesses of any machine or equipment, cost of operating any machinery by single unit or department, and supplying engineering departments with pertinent data that they may require relating to machine tools or equipment.

Here are some examples of cost control:

a. Every week a detailed maintenance cost report is issued to each area, making it possible for production and maintenance personnel to check and compare costs of their particular area.

b. Cost of a rebuild or a troublesome job may be determined in detail simply by a telephone call or communication.

c. The weekly cost and year to date cost of the 10 machines or pieces of equipment having the highest cost for that week is issued to the plant manager and each department manager on a weekly basis.

d. It has been possible to break out detailed spindle cost of machinery by department and plant, comparing costs per engine for precision spindles in machining of six cylinder versus eight cylinder engines.

Another one of the aids in the productive maintenance program is the standards program. This includes standardization of materials, processes, industrial equipment and methods and specifications which in turn simplifies the problem of keeping adequate replacement supplies in stock.

Another important factor is the use of the Joint Industry Conference Standards. These standards provide detailed specifications for the application of electrical, hydraulic, lubrication and pneumatic apparatus to machine tools and other industrial equipment.

The development of automatic machinery created an urgent need for standardization in these fields because in the early stages maintenance costs were often excessively high and the trouble arose chiefly from lack of standards.

This problem involved many users and suppliers and it was necessary that it be solved on an industry-wide basis. Joint action was required among the automobile manufacturers, equipment builders and associations in those fields. Recognizing this, representatives from the various industries, machine tool builders, and other associations, developed what is now known as the J. I. C. Standards.

The Standards developed were based on logical systems of identification, greater accessibility of components, better protection from contamination and hazards; and have resulted in more efficient and safer operation of machines and equipment.

Very often in the past, electrical control panels were supplied with not enough consideration given to safety, identification of apparatus and wiring, accessibility for maintenance, or the

BURR-MASTER

For Every Gear Deburring Job

You can't afford obsolete methods when Burr-Masters can "deburr and chamfer" gears and splines up to 300 teeth per minute!

Universal machines for internal gear and spline deburring. Data in Bulletin 103-81.

Hypoid pinion deburring machines are available in single or multiple station models. Data in Bulletin 103-100.

Eight Universal models, single or two station, deburr and chamfer spur or helical gears and external splines. Get complete data in Bulletin 103-60.

14230 BIRWOOD AVE.

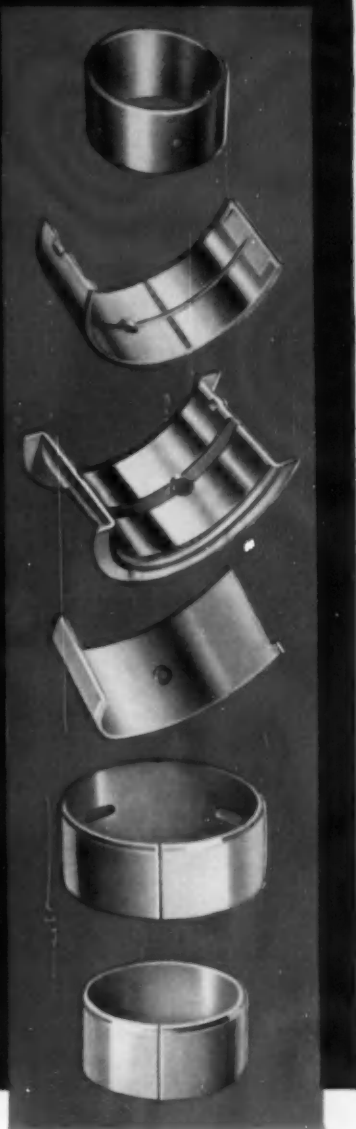
MODERN

Industrial Engineering Co.

DETROIT 38, MICHIGAN

BEARINGS...

A Control Factor in Performance!



RESEARCH • DESIGN • METALLURGY • PRECISION MANUFACTURING

Today's trucks owe much of their fine performance to unseen bearings and bushings. Because they "take the rap" of thrust loads from pistons, protect the crankshaft from excessive wear, meter internal lubrication, these high-precision parts are a vital control factor in ultimate performance. We are specialists in quality bearings and bushings for engine, transmission and chassis applications and a major supplier to the truck-building industry. FEDERAL-MOGUL CORP., Detroit 13, Michigan.

FEDERAL-MOGUL

SINCE 1899



exclusion of foreign matter which impaired the operation of electrical devices.

At present, by adhering to J. I. C. Standards, we have control panels with hinged covers closing on gaskets, external mounting lugs, control wiring and devices well marked, and line switches that must be in the "Off" position before a worker can gain access to the panel. In addition, complete wiring diagrams, sequence of operation and stock lists accompany the panel thus making it easier and faster for electricians to determine causes of trouble when stoppage occurs.

Another important feature was standardization of oil reservoirs and power units. A few years ago, it was common practice to locate hydraulic reservoirs in inaccessible locations under the machines. The hydraulic components were very often concealed which made them difficult to maintain. Hydraulic and electric controls were located in a common enclosure thus making for unsafe conditions. Today, these important hydraulic components have been removed from under the machines and are readily accessible for maintenance. Their operations can also be observed while the machine is

in operation. Sealed reservoirs have been provided to prevent contamination of the hydraulic oil. Large openings have been provided for clean-out purposes. Provisions have been made for oil filtration, and adequate reservoir capacity aids in lowering the operating temperature of the oil.

Ford's maintenance program approach has changed completely over a comparatively short period of time. Methods that formerly were desirable are now mandatory. Productive maintenance planning has had to keep pace with the new advanced techniques of manufacturing.

The use of automation in Ford plants is a trend which will continue to expand. The advantages have far outnumbered the disadvantages. Through use of automation greater safety, better working conditions, lower cost, increased production and conservation of manpower have been achieved. Although automation does conserve manpower, it does not eliminate manpower from the industrial scene. Instead, it frees men from the many burdens and hazards of industry and provides more interesting jobs which utilize their brainpower more effectively. Actually, fewer unskilled tradesmen are needed because of the more technical operations but many more engineers, electricians, electronics men and specially skilled workers to keep the highly complex production lines in efficient working order are required.

To carry the point still further, growth of automation will create many new jobs in machine tool, electronics, and other industries engaged in building new automated factories. These industries, in turn, will have to expand their own facilities in order to meet the growing demand and that in turn will provide more jobs.

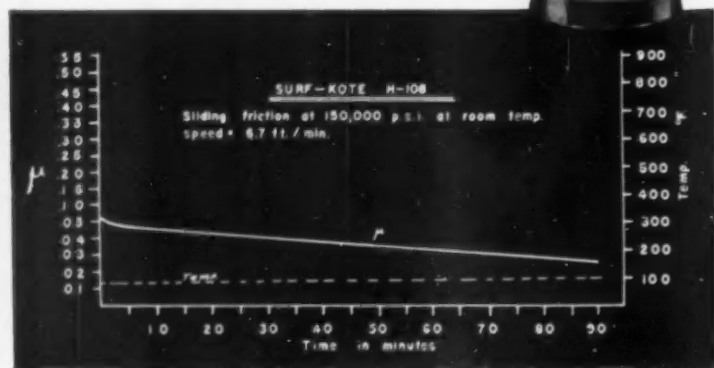
In conclusion, automation, despite its proven performance and tremendous progress in recent years, is in its infancy. Ford men do not consider themselves qualified to say what its ultimate long-term effects will be on the Nation's industry and economy as a whole. They are convinced, however, that anything which elevates man from drudgery—while giving him better products at the same or lower cost—is fundamentally good. Regarded as an evolutionary development, rather than a revolutionary one, automation has started a trend which will continue and will expand in the future as its benefits become known.

The above article is from a paper presented by the author at the semi-annual meeting of the American Society of Mechanical Engineers in Boston last month.

Lubricate with a dry solid film

SURF-KOTE

provides low coefficient of sliding friction



Here's the modern, proved way to lubricate where conventional methods are impractical. When applied to metal surfaces, Surf-Kote forms a hard, continuous inorganic film that lubricates even at extreme pressures. Has excellent anti-galling and seizing

properties. Opens new possibilities in production design. Ideal for use wherever water, steam, pressure and extremes of temperature are encountered, or where parts are inaccessible for oiling or greasing. Easy to apply by spraying, brushing or dipping.



MAIL COUPON FOR FREE DATA!

Please send me free folder "Solid Lubricants Might Be the Only Answer"; also Surf-Kote data sheets and sample coated parts.

Name _____
Title _____
Firm Name _____
Address _____

HOHMAN Plating & Mfg., Inc.

905 E. Third St., Dayton 2, Ohio



336,000

miles of extrusions!



Our extruders have turned out enough plastic and rubber extrusions to reach to the moon and halfway back. In compiling this vast experience General Tire's Industrial Products Division has supplied thousands of original equipment manufacturers with just about every known type of extrusion. No job is too large, too small or too complicated for our design and production staff. Perhaps you can benefit from the fantastic extrusion mileage we've accumulated down through the years.

For literature or further information write to The General Tire & Rubber Company, Wabash, Indiana, Department D



Industrial Products Division
WABASH, INDIANA

"From Plans to Products in Plastics and Rubber"

BUSINESS PULSE

(Continued from page 100)

the neighborhood of 1.80 in the month's preceding the 1953 business downturn. It may very well be that the latest round of wage increases, since it foreshadows higher prices for some raw materials, will spur businessmen to intensified efforts at inventory accumulation.

Free Spending

The reason for the favorable inven-

tory experience to date seems to be that the consuming public, including business concerns, has been unusually free in spending its income and in buying on credit. Personal income has naturally risen very rapidly since the recovery began, and since tax liabilities have changed only moderately, the increase in income has been pretty much at the disposal of recipients. Had the latter merely increased their expenditures by the amount of the rise in income, the fillip to trade would have been substantial. What they have in fact done is to increase their expenditures by more than their

income rose, a feat made possible principally by increased buying on credit. Whereas disposable personal income rose by \$8.3 billion at an annual rate between the first quarter of 1954 and the first quarter of this year, personal consumption expenditures rose by \$11.5 billion.

Labor Market Improves

The labor-market situation, which was only fair in the early phase of the business recovery, has recently begun to show marked improvement. In May total civilian employment rose by a million for the second successive month to a new May high of 62.7 million. Unemployment fell by an estimated 500,000, one of the largest declines ever recorded for the month, to 2.5 million, the lowest level since December, 1953.

Most analysts judge the outlook to be bright for the remainder of this year, but more and more of them are coming to lay emphasis on the point that if general activity is to move to higher ground the impetus will have to come from industries other than the "big three." For with steel running into the capacity barrier, with construction characterized by cross tendencies (residential slipping, non-residential expanding), and with the automobile situation complicated by an inventory problem, it seems questionable that the "big three," collectively, will do more than hold their own over the remainder of the year.

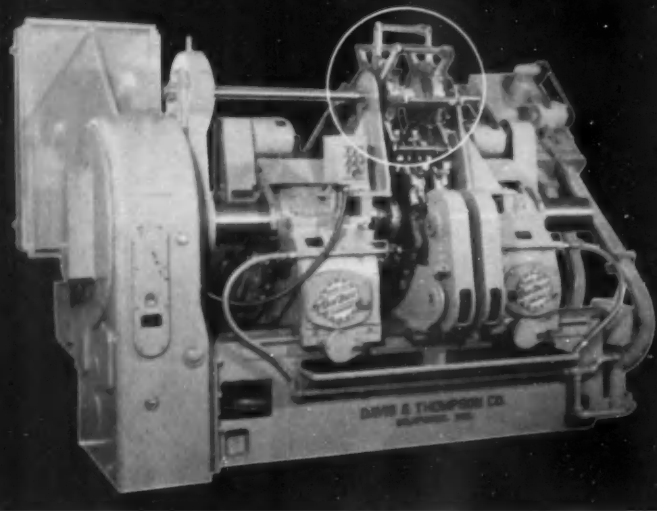
There is still slack in many of the smaller industries, so the potentiality for expansion is present, given the demand. In the light of the liberal spending policies of both consumers and business, the prospects for continuing strong demand seem good, particularly since there will probably be additional tax reduction in 1956.

These considerations suggest that a period of further gains in output and employment, following a seasonal lull this summer, is not unlikely. This, at least, seems to be the consensus.

Only 492 Metallurgists To Graduate This Year

Industry is concerned over the declining number of metallurgical engineering graduates. According to a survey by the American Society for Metals, only 492 metallurgy degrees will be granted this year. Last year, 549 students were graduated. Despite substantial starting salaries offered to graduate metallurgists by industry, the field is not attracting enough students to meet the present critical demand.

...Milling and Centering Steering Gear Shafts at the Rate of 360 Per Hour



This continuous type milling and centering machine has been furnished with an automatic unloader (indicated by circle) which transfers finished parts onto a conveyor or discharge chute. Milling and centering of both ends is done simultaneously and in continuous production.

Basically, this is a standard ROTO-MATIC machine tooled-up to handle special production requirements. Rough and finish milling and centering spindles in both heads have micrometer endwise adjustment. Heads are adjustable on the ways. With equalizing jaws in fixtures plus chain clamping, machine is fully automatic. If you have work of this nature, consult D&T engineering for further details.



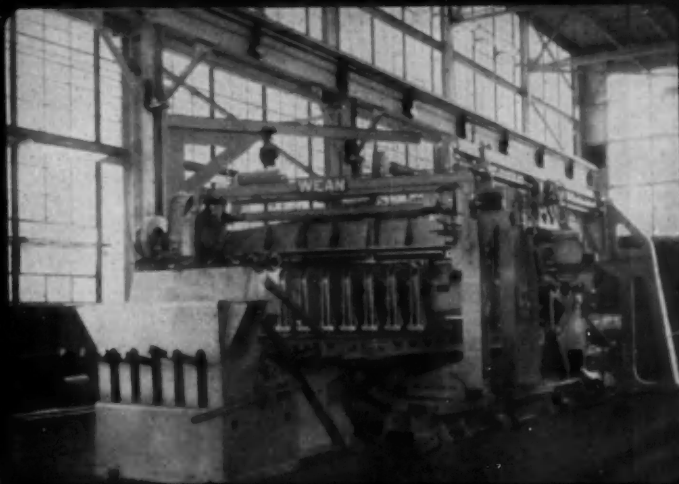
Davis and Thompson Co.

4460 N. 124th ST.

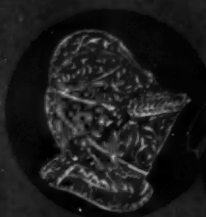
MILWAUKEE 10, WISCONSIN

need an idea?

Wean Trapezoidal Shear Line Solves Problem for Auto Maker



The Wean Trapezoidal Shear Line was developed as an answer to the high speed blanking of irregularly shaped pieces in the broad range that can be described as trapezoids or parallelograms. This use reduces tremendously the cost of expensive die setup in major blanking presses. Two pieces are made at each index with the accuracy that can only be achieved by a measured length indexing system. The cut can range from 45° to 90° angles. The latter setting establishes the line as a straight cut-up unit with twice the normal production of conventional shear lines. At Wean, we consider this line as another important step forward in our policy of cost reduction through progressive engineering. People in the automotive and metal fabricating fields have come to look more and more toward Wean Equipment for spectacular advances in machinery for metal processing.



Wean

EQUIPMENT CORPORATION
CLEVELAND, OHIO

Offices:
CLEVELAND • DETROIT • CHICAGO • NEWARK, N.J.
Cable: WEANCOR

MEN in the NEWS

(Continued from page 186)

Northrop Aircraft, Inc.—**John R. Alison** has been named vice-president in charge of customer relations; **Robert R. Miller**, administrative vice-president; and **Gil Nettleton**, assistant to the president.

Minnesota Mining & Mfg. Co.—**C. C. March** has been named general manager of the Coated Abrasives and

Related Products Div.; **R. W. Mueller**, general manager of the Fibrous and Industrial Tape Div.; **John F. Whitcomb**, general sales manager of the Coated Abrasives and Related Products Div.; and **Richard L. Sheppard**, general sales manager of the Cellophane Tape Div.

Champion Spark Plug Co.—**Carl J. Eaton** has been named director of engineering, and **L. R. Lentz** has been made assistant director.

Chrysler Div., Chrysler Corp.—

John O. Montgomery is now director of public relations.

ElectroData Corp.—**Joseph B. Rice** has been named vice-president of manufacturing.

Mercury Div., Ford Motor Co.—**William H. Grimes** has been made manager of the merchandising and product planning office.

Chrysler Corp.—**Earl E. Orcutt** is now manager of engineering material operations.

Gar Wood Industries, Inc.—**Milton G. Peck** was named vice-president and director of sales and advertising.

Dodge Div., Chrysler Corp.—**Fredrick T. Cushing** is now truck fleet sales supervisor.

Nash Motors Div., American Motors Corp.—**Robert J. MacCulley** has been promoted to assistant sales promotion manager.

Mack Mfg. Corp.—**J. M. Steffee** was named vice-president and director of purchases.

Delco Products Div., General Motors Corp.—**James A. McNamara** has been appointed comptroller.

Moog Industries, Inc.—**Hubert P. Moog** is now president, and **Hubert P. Moog, Sr.**, has become chairman of the board.

Electric Auto-Lite Co., Export Div.—**Richard V. Johnson** has been appointed manager.

Mercury Div., Ford Motor Co.—**William A. Maharry** is now public relations manager.

Temco Aircraft Corp.—**D. R. Tacke** has been promoted to chief of development.

Clark Equipment Co., Axle Div.—**Robert C. Andrews** has been appointed sales manager.

Cadillac Motor Car Div., General Motors Corp.—**M. E. Fields** was named assistant general sales manager in charge of the Eastern part of the U. S.

Modine Mfg. Co., Automotive Div.—**Robert C. Verhaeghe** has been named chief engineer.

Herman Body Co.—**John A. Zenzen** has been named general sales manager.

Etco Tool Co., Inc.—**Robert G. Emrick** has been elected president, succeeding **Melvin H. Emerick**, now chairman of the board.

(Turn to page 203, please)

A Commanding Signal...DAY OR NIGHT



Of all the signals devised for general automotive use, nothing is so commanding, so safe as the flashing light. . . And the heart of the directional signal system is the Tung-Sol Flasher.

In addition to the blinking action, the Tung-Sol Flasher provides for an instrument panel pilot light. And the audible "tick-tick-tick" which is purposely built into the flasher further assures the driver that his signals are working.

More than 25 million Tung-Sol Flashers have been installed by car manufacturers since 1939. Rarely replaced, the Tung-Sol Flasher combines high performance with low installation costs.

Wherever a signal light is employed, a Tung-Sol Flasher will make it more commanding. Tung-Sol Electric Inc., Newark 4, N. J.

Sales Offices: Atlanta, Chicago, Columbus, Culver City, Dallas, Denver, Detroit, Montreal (Canada), Newark, Philadelphia, Seattle.

TUNG-SOL AUTO LAMPS · SIGNAL FLASHERS



HOW TO GET ALONG WITH YOUR LATHE OPERATOR'S WIFE



A suggestion

Ask your foremen what are the most tiring jobs in their departments. Then phone your local Bellows Field Engineer (he's listed in your phone book under The Bellows Co.). Ask him how Bellows "Controlled-Air-Power" can remove the fatigue from those tiring jobs.

Executives interested in pleasant labor relations would do well to talk to the wives of their employees. They would learn that a tired worker makes a grouchy husband; a grouchy husband, a discontented wife. And the effect of "family" trouble on your production can be a serious matter.

Operator fatigue resulting from repetitive manual movements can be quickly reduced in an almost unlimited number of jobs with Bellows "Controlled-Air-Power" Devices. These versatile, inexpensive, power units can perform almost any repetitive manual motion faster, safer and better than your most skilled workman. They feed work to tools, tools to work; open and close work holding devices; position and eject parts with speed and accuracy. They are easily installed on lathes, drill presses, tapping machines, milling machines, grinders, etc. They can form the "heart" of countless special purpose machines you can build in your own plant.

Not only will these versatile devices end "fatigue" problems in many of your operations, but they will enable any operator to produce more — at lower cost.

The Bellows Co.

AKRON 9, OHIO

Bulletin CL-50 (free on request) describes Bellows devices — and tells how they are used. Write: The Bellows Co., Dept. AI-755, Akron 9, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., 14 Advance Road, Toronto.

1222-A

Another PRODUCTION SOLUTION
by

MOTCH & MERRYWEATHER

*Does the
Job Best!*

A variety of machining operations, unique in sequence, is combined on a new 15-station automatic transfer machine. Grouping standard machine tool units attains maximum production and utilizes automation. In addition, the M. & M. Triple-Chip circular saw cut-off makes possible the use of low cost stock material; increases your ultimate savings. Start by sending us your part drawings for a production solution by Motch & Merryweather.

**THE
MOTCH & MERRYWEATHER
MACHINERY CO.**

MACHINERY MANUFACTURING DIVISION
CLEVELAND 13, OHIO

*Builders of Circular Sawing Equipment,
Production Milling, Automatic and Special Machines*



Part Name:

Cylinder bracket.

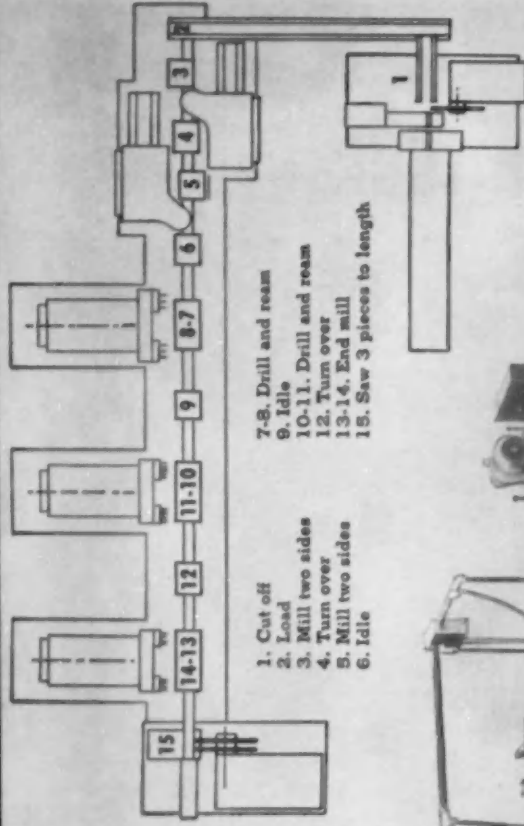
Production:

384 pieces per hour.

Material:

3" x 2 1/4" x 1/2" angle
iron, standard milled
stock.

1. Cut off
2. Load
3. Mill two sides
4. Turn over
5. Mill two sides
6. Idle
- 7-8. Drill and ream
9. Idle
- 10-11. Drill and ream
12. Turn over
- 13-14. End mill
15. Saw 3 pieces to length



**MOTCH & MERRYWEATHER
15-STATION
AUTOMATIC TRANSFER MACHINE**



MEN in the NEWS

(Continued from page 200)

Minnesota Mining & Mfg. Co., Adhesives & Coatings Div.—**Howard F. Norman** and **August J. Kochis** have been named product manager for industrial trades and Government representative, respectively.

Camdale, Inc.—**F. Leroy Hill** was elected chairman of the board.

Gabriel Co.—**William H. Kieber** is now engineering and sales consultant, and **William G. Patriquin** succeeds him as assistant chief engineer.

Consolidated Engineering Corp., Systems Div.—**Glyn A. Neff** has been made project chief for data processing systems.

General Electric Co.—**Robert A. Averitt** is now manager of aviation systems engineering for the Aviation and Defense Industries Sales Dept.

Rezolin, Inc.—**Lloyd J. Oye** has been named national director of marketing.

Kelvinator Div., American Motors Corp.—**J. W. Lelivelt** is now manager of manufacturing.

Ford Div., Ford Motor Co.—**F. J. Fischer** has been named assistant controller.

Servomechanisms, Inc.—**Croydon H. Hartley** is now foreign activities director.

Alan Wood Steel Co.—**Harleston R. Wood** has been elected president and chief executive officer, succeeding **John T. Whiting**, who continues as chairman of the board.

Electro Metallurgical Co.—**Arthur R. Lytle** was made vice-president in charge of research.

Blue Crown Spark Plug Corp.—**James W. Balough** has been made sales manager.

General Tire & Rubber Co., Textile-leather Div.—**Charles L. Becker, Jr.**, has been named manager of customer relations.

Norton Co.—**Edward D. Porter** and **J. Zach Higgs** have been appointed manager and superintendent, respectively, of the new Huntsville, Ala., electric furnace plant. **Robert M. Scott** has been appointed refractories engineer for the Cincinnati area, succeeding **Gerald H. Lusher**, now refractories engineer for a new western sales territory.

Willys Motors, Inc.—**Sam F. Green** has been named manager of special equipment and specialty vehicles.

Dodge Div., Chrysler Corp.—**Byron S. Snowden** is now assistant sales manager-trucks in charge of advertising and sales promotion.

Thermal Research & Engineering Corp.—**E. H. Seymour** has been appointed chief engineer.

Four Wheel Drive Auto Co.—**John G. Thompson** was chosen director of parts and services.

Permacel Tape Corp.—**George A. Fitzgerald** has been named a vice-president.

North American Aviation, Inc.—**Gerald B. Brophy** has been elected a vice-president.

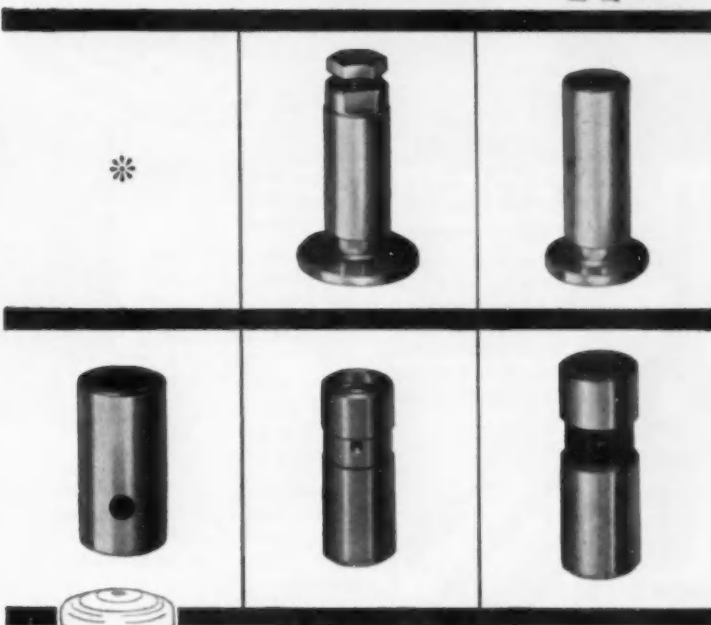
U. S. Rubber Co., Rubber Purchasing Div.—**Perry S. Odell** has been appointed head.

National Automotive Fibres, Inc.—**N. J. Rakas** has been chosen director of research and development.

Carborundum Co., Coated Abrasives Div.—**Arthur E. Darcy** has been made manager of the Machine Methods Dept.

(Turn to page 204, please)

JOHNSON *tappets*



** keep pace with today's engines*

Continual experimentation and excellent manufacturing methods show a steady product improvement that make JOHNSON TAPPETS worthy of your consideration.

Only proven materials, covering a range of steel, chilled iron, and various iron alloys are used in the manufacture of JOHNSON TAPPETS, providing greater strength, light weight and increased wear resistance. Serving the AUTOMOTIVE — AIRCRAFT — FARM — INDUSTRIAL — MARINE Industries.

"tappets are our business"

JOHNSON *Jp* PRODUCTS
MUSKEGON, inc. MICHIGAN

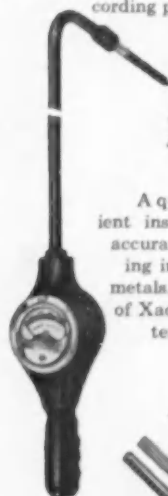
PRECISION TEMPERATURE

measurement
and control



GORDON XACTLINE

Controls temperature automatically within a fraction of a degree in any heat process. A complete factory-assembled unit ready for installation anywhere. Can be used with any existing indicating or recording pyrometer controller—regardless of age.



GORDON XACTEMP Hand Pyrometer

A quality-built, convenient instrument for quick, accurate temperature reading in molten nonferrous metals. Also, other models of Xactemp for all-around temperature checking.

GORDON SERV-RITE

Thermocouple Wire
Thermocouple Extension Wire

Insulated in Gordon's own plant to assure consistent quality. All standard wire and insulations carried in stock for quick delivery. Other wires, in long or short runs, manufactured to specifications.

Full Particulars on Request

**GORDON
SERVICE**

CLAUD S. GORDON CO.

Manufacturers • Engineers • Distributors
Temperature Control Instruments • Thermocouples & Accessories • Industrial Furnaces & Ovens • Metallurgical Testing Machines

601 West 30th Street, Chicago 16, Illinois
2037 Hamilton Avenue, Cleveland 14, Ohio

MEN in the NEWS

(Continued from page 203)

Chance Vought Aircraft, Inc.—H. B. Sallada has been named executive vice-president; R. C. Blaylock, vice-president of engineering; N. V. Turney, vice-president and controller; C. E. Burt, vice-president of production; and W. P. Thayer, vice-president of sales and service.

Dow Chemical Co., Midland Div.—William H. Schuette has been made general manager.

Allis-Chalmers Mfg. Co., Tractor Div.—Arthur E. Thode has been appointed industrial advertising manager.

Purolator Products, Inc., Jobber Div.—John W. Bury is now sales manager.

Clark Equipment Co., Industrial Truck Div.—John J. Mlynski has been made central region sales manager.

Vanadium Corp. of America—Henry S. Schaufus was named chief metallurgical engineer.

Servomechanisms, Inc., Components Div.—John J. Dempsey has been made manager.

Philadelphia Gear Works, Inc.—S. L. Crawshaw has been appointed assistant to the president.

De Soto Motor Corp.—David R. Crandall, Jr., has been appointed central zone manager.

National-U. S. Radiator Corp., Plastic Metals Div.—B. T. duPont has been appointed general manager, and C. E. Hanson has been named sales manager.

Cleveland Instrument Co.—David M. Gaskill is now sales manager, and Robert F. Baskin has become manufacturing manager in charge of engineering and production.

National Automotive Fibres, Inc.—William J. Athanson has been elected executive vice-president.

Brooks Equipment & Manufacturing Co.—Frank Lang, Jr., has become resident plant manager.

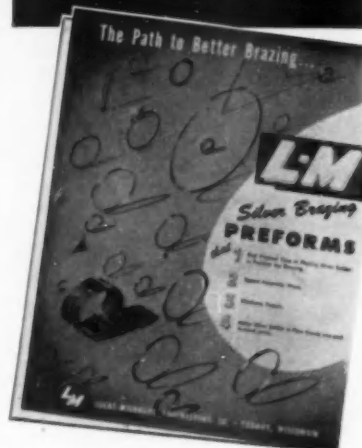
Chrysler Corp.—Robert F. Bowers is now director of management personnel.

Fawick Corp.—James P. Falvey and William E. Rutz have been elected to the board of directors.

Tinnerman Products, Inc.—John E. Potter has been elected secretary and treasurer.

(Turn to page 206, please)

IF Silver Brazing IS PART OF YOUR PRODUCTION



You'll Need This Helpful 10 Page Reference Book

Here's a 10 page booklet that gives you all the information you need on the advantages and use of Silver Brazing Preforms.

- Gives you complete information on No Tangle-Notch Coil Rings, how they increase production, save time and labor in handling alloy.
- Helps you select the proper preform for the job. Contains charts that illustrate the type joint, recommended preform and simple ordering data.
- Gives the complete line of coined and blanked washers, and silver brazing and soldering alloys available.
- Helps you get quick, accurate alloy calculation with calculating tables for all commonly used alloys.

Send for FREE Copy Today!



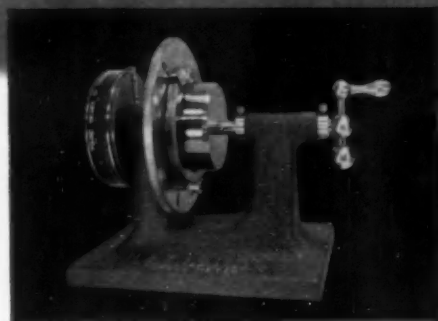
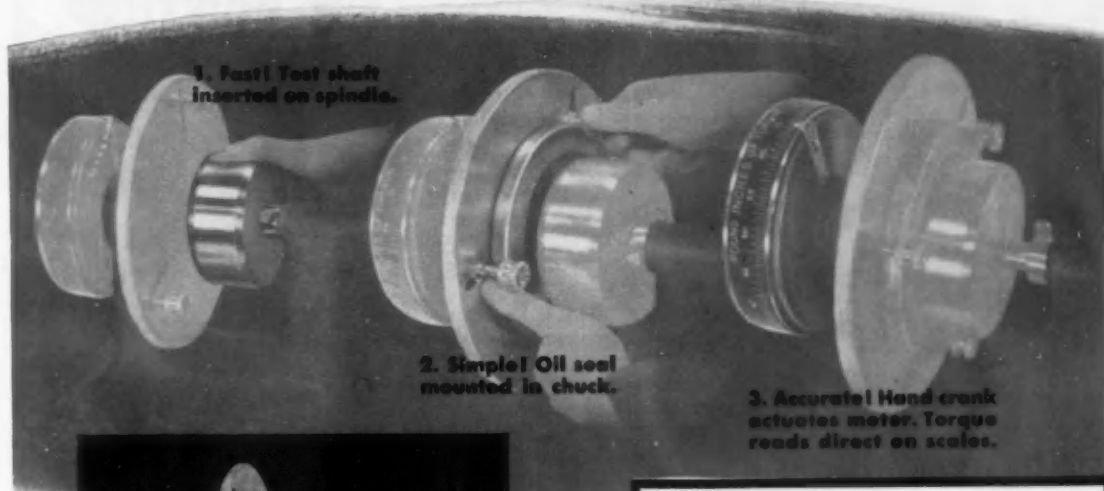
**LUCAS-MILHAUPT
ENGINEERING CO.**

5055 So. Lake Drive Cudahy, Wisc.
(Suburb of Milwaukee)

AUTOMOTIVE INDUSTRIES, July 15, 1955

Now! MEASURE OIL SEAL TORQUE

quickly, accurately, by hand!



New NMB Portable Torque Meter

For years, industry has needed a fast, accurate means of measuring oil seal torque for standards determination or during quality control and parts inspection.

The new NMB Portable Torque Meter offers laboratory accuracy for such measurements, yet is rugged, fool-proof, and easily used by production line or receiving department personnel. A minimum of operator training is required; readings are instantaneous and direct.

Two models are offered. Model 615 reads torque to 15 lb. in. on seals from $\frac{3}{4}$ " to 6" diameter; Model 845 reads torque to 60 lb. in. on seals from $2\frac{3}{4}$ " to 8" diameter. Both have a simple, self-centering chuck which accurately positions the seal, and employ standard tapered shafts (special to order). The meters are lightweight (about 27 lbs.) and quality built for years of dependable service. A carrying case is available.

Meter proves low torque of NATIONAL OIL SEALS

National Torque Meters give quick, convincing proof that National Oil Seals have lowest torque.

National Micro-Torc Leather Oil Seals have appreciably less torque than conventional leather seals. National Syntech® synthetic rubber seals also test materially less torque than ordinary synthetics.

Micro-Torc seals achieve their remarkably low torque from a high lubricity coating applied to the surface of the sealing member. (Inside of sealing member retains natural porosity and stores oil for semi-starved operation.)

Syntech Oil Seals have the famous National "minimum-contact" sealing lip which, combined with precision tensioning, insures the lowest torque consistent with effective sealing.

NATIONAL MOTOR BEARING CO., INC.

General Offices: Redwood City, California

Plants: Redwood City, Calif., Downey (Los Angeles County), Calif., Van Wert, Ohio



Call in a National Field Engineer

CHICAGO, ILL. . . . Room 4113 Field Building, FRanklin 2-2847
CLEVELAND, OHIO . . . 210 Heights Rockefeller Bldg., YEllowstone 2-2720
DALLAS, TEXAS . . . 30 1/2 Highland Park Village, JUstin 8-8453
DETROIT, MICH. . . . 726 Lothrop Avenue, TRinity 1-4363
DOWNEY (Los Angeles Co.), CALIF. . . 11634 Patten Rd., TOPas 2-8166

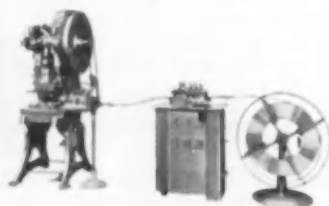
INDIANAPOLIS, INDIANA . . . 2802 North Delaware St., WALnut 3-1535
MILWAUKEE, WIS. . . . 647 West Virginia Street, BRoadway 1-3234
NEWARK, N. J. . . . Suite 814, 1180 Raymond Blvd., MITchell 2-7586
REDWOOD CITY, CALIF. . . . Broadway and National, EMerson 6-3861
WICHITA, KANSAS 519 South Broadway, WIchita 2-6971

FLEXIBILITY in Stock Straightening



WITTEK STOCK STRAIGHTENERS

Used in conjunction with a reel stand and automatic feed for punch presses, the Wittek Stock Straightener is a self-contained, motor-driven unit designed for maximum efficiency in the continuous straightening of coiled stock. Standard models handle stock with widths up to 12 inches. An infinitely variable speed drive permits any desired straightening speed so that the proper slack is maintained in the straightened strip between the unit and the press feed.



This typical Wittek automatic production feeding setup includes—Wittek roll feed mounted on the punch press, Wittek stock straightener, and Wittek self-centering reel stand.

Write for full particulars

WITTEK Manufacturing Co.



4319 W. 24th Place • Chicago 23, Illinois

MEN in the NEWS

(Continued from page 204)

Consolidated Engineering Corp.—Hugh F. Colvin and Victor J. Pollock were named to the board of directors.

Ryan Aeronautical Co.—Frank W. Fink joined the company as vice-president and chief engineer.

Chrysler Corp.—Walter M. Spencer has been promoted to director of service of the Dodge Division, succeeding Ben B. Settle, who has been assigned to the executive service staff of Chrysler Corp.

Potter & Johnston Co.—Edward P. Gillane has been elected president and general manager, and Wilfred J. Pender, vice-president and factory manager.

Convair Div., General Dynamics Corp.—Adolph Burstein has been appointed assistant chief engineer and S. G. Frank Haas, Jr., chief development engineer.

General Controls Co.—Richard W. C. Barr has been appointed manager of the Boston branch.

DeWalt, Inc.—Conde Hamlin, formerly vice-president, has been elected president.

R. G. LeTourneau, Inc.—Nathaniel E. Jones has been appointed public relations supervisor.

Lear, Inc., Grand Rapids Div.—T. K. Greenlee has been appointed division engineering manager.

Raybestos-Manhattan, Inc., Wabash Div.—B. T. Collins has been made product development engineer.

Kaiser Aluminum & Chemical Corp.—L. J. Barker has been appointed chief specification engineer.

Soreng Products Corp.—Harley Newcomb is now manager of automotive sales.

Rochester Products Divs., General Motors Corp.—Kenneth F. Lings has been promoted to service manager.

Napco Industries, Inc.—Fred Hartlage was appointed director of marketing.

Dodge Div., Chrysler Corp.—Charles W. Mote is now manager of the forge plant.

Stewart-Warner Corp., South Wind Div.—Edgar L. Conn has been made manager.

Consolidated Engineering Corp., Research Div.—Richard B. Hurley was named senior research engineer.

CONTROLLED FOR PRECISION RIVETING

FEED SPEED

FORCE AND
RATE OF
IMPACT

POSITIVE
FEED LIMIT

VARIABLE
SPINNING
SPEED

DURATION
OF PEEN
CONTACT

AUTOMATIC
WORK CYCLE



Now... rivet accurately what you want and how you want it. Put the precise controls of Airflex® Riveters to work for you. Here's a new method of fastening that opens new possibilities for you. Exclusive Airflex® principle combines high frequency blows (15,000 b.p.m. max.) with spinning action to cold-flow any type of rivet in any material. Force, rate and duration of impact are independently controlled at optional air pressures. Automatic work cycle is selective and has emergency stop. Rivet sizes 1/16" to 1".

Airflex® takes the tough and routine jobs. Write for information.

LEMERT ENGINEERING CO., INC.
179 E. JEFFERSON ST., PLYMOUTH, IND.

Airflex®
RIVETERS DIMPLERS

THE NUMBER FOR SATURDAY...

134

Numbers aren't emotional or animated.

People are emotional, lovable and very animated.

Number 134 is a statistic. It says 134 people will die in auto accidents this Saturday. It doesn't say

Who Dies or

Where They Die

it only says *will die*.

The certainty of it is frightening.

When you get behind the wheel of your car this Saturday, remember . . . 134 is your enemy. Don't contribute to its success by being inconsiderate on the road. You have everything to gain by being courteous and careful . . . and the lives of the animated innocents to lose by being careless.

There's a number for every day of the week (average figures for automobile fatalities) . . .

134 is the number for Saturday,

115 is the number for Sunday,

70 is the number for Monday, Tuesday and Wednesday,

83 is the number for Thursday, and

95 is the number for Friday.

These numbers are your enemies. Fight them every day of the week. The next time you pull out to pass a car on a curve or on a hill, *think of the number*. Every time you're in a hurry and press heavily on the accelerator . . . *think of the number*. Every time you get behind the wheel . . . there's a number for that day. When you're careless on the road, you're risking a bad trade—your name for a number.

National safety groups, automobile manufacturers and automotive suppliers are all constantly striving to reduce accidents and make driving safer and more pleasant.

One of these suppliers, Auto Specialties Mfg. Co., Inc., of Saint Joseph, Michigan, has developed safer brakes for today's more powerful cars: Auto Specialties Double-Disc Brakes. These brakes, designed on an entirely different principle, have passed the severe braking tests of the leading car factories. Auto Specialties Double-Disc Brakes make driving safer, make drivers surer of their brakes. Their adoption will be in keeping with the automotive industries' aim for safer and safer driving.

A 16-page, 4-color book, "The Stopping Story," gives detailed information about these brakes. It's free. Write for it to

AUTO SPECIALTIES MFG. CO., INC.
SAINT JOSEPH, MICHIGAN

Plants also at Benton Harbor and Hartford, Michigan
and Windsor, Ontario, Canada

Manufacturing for the automotive and farm machinery industry since 1908

Director of MANUFACTURING

Medium size metal manufacturing company located in Middle West needs a highly qualified Director of Manufacturing. Will assume direction of manufacturing in multi-plant operation. Must have experience as head of manufacturing in light metal fabrication and machining such as automotive parts or accessories. An excellent opportunity for a hard-hitting, progressive administrator. Age 40-55. Engineering training preferred. Compensation open. Reply in confidence.

Box 95, Automotive Industries
Chestnut & 56th Streets
Philadelphia 39, Pa.

Director of Sales

Midwest firm manufacturing light sheet metal stampings and machined items needs Director of Sales to organize and improve sales programs and assist in product development. This is a challenging opportunity for an aggressive, self-starting sales executive. Require broad administrative and sales experience, preferably in automotive or appliance fields. Helpful if sales background is strong in engineering of products for customer needs. Must have successful record, including multiple product sales effort, sales analysis, product analysis and development, administration. Compensation open. Marketing and engineering training. Age 40-50. Reply in detail, in confidence, including earnings record.

Box 94, Automotive Industries
Chestnut & 56th Streets
Philadelphia 39, Pa.

French Aircraft Industry

(Continued from page 59)

seat, single-jet Baroudeur fighter attracted attention by reason of its ability to take off and land on almost any kind of country. Starting is from an undercarriage with low pressure tires and landing is done on skids.

Designated the Coccinella, the Sipa 1000 is an attempt to produce a two-passenger plane at the price of the cheapest automobiles on the European market. It is a low wing monoplane, and maximum use is made of automobile parts. The fuselage is a welded steel tube construction with detachable light metal panels in front and canvas covering at the rear, while the wings also are steel construction with canvas covering. Two types of Continental engine are available, with or without electric starter. Weight is 660 lb. Carrying two persons side by side, cruising speed is 105 mph, and range 375 miles. The same firm showed the Sipa 300 turbojet trainer powered by a Turbomeca Palas of 354 lb thrust.

In the helicopter section, interest centered on the Bristol 173 twin engine, twin-rotor machine which took

off from Waterloo Station in London and landed on the Paris exhibition ground two hours later. The Alouette II, which holds the world's altitude record with a figure of 26,936 ft, is built by the South-East Aviation Co. and is powered by a Turbomeca 400 hp turbine. The record altitude was reached in 42 minutes. All-up weight is 2870 lb, and cruising speed in forward flight is about 110 mph. Three helicopters of this type are on order for the French Navy. Another record-breaker was the Bell helicopter which recently landed on the summit of Mount Blanc at an altitude of 15,771 ft.

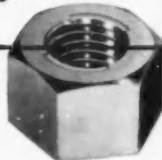
Unlike the Farnborough display, where all the planes have to be on the ground the first day, the French authorities kept their latest types on the official test ground, shrouded in mystery, and it was not known until the last two days, when a great flying display was held to impress the public, whether they would be seen or not. Among these was the Dassault MD 550, a delta-wing interceptor with two Viper engines and a two-stage rocket.

B
U
Y

B
O
N
D
S

M.F.

Uni-Torque



NO EXCESS COST
NO SLOTS
NO FIBRE
NO PLASTIC

**Mac Lean-Fogg
Lock Nut Company**

5535 NORTH WOLCOTT AVE.
CHICAGO 40, ILLINOIS

WE SELL
RELIABILITY
OF TORQUE

AND ALWAYS
DELIVER
THROUGH
SIMPLICITY
OF DESIGN

Did you ever check your present lock nut for consistency of torque? It means everything in a lock nut! TESTS SHOW that due to more precise manufacturing techniques and simplicity of design, the M-F Uni-Torque delivers the most consistent torque.

"FEW OLDER IN EXPERIENCE... NONE
YOUNGER IN FACILITIES AND DESIGN"

"I, sir, wash my own car!"

This car washing is a great American hobby. As soon as one man starts, you find the whole neighborhood outside, kinking the hose, sloshing through puddles, having fun. They wield an incredible array of long-handled brushes, sprays and mops, assisted by a witches brew of foaming detergents, cleaners, waxes, powders, pastes, liquids and creams.

When the car is washed, the man of the house begins an inch-by-inch check of the glittering trim. Does it really shine? Or does it blister? Or peel?

People are proud of their cars, and they want them to stay bright. If your dealers can assure prospects that the trim will resist corrosion and denting like nothing else, you might furnish that nudge that clinches a sale.

When your trim is made from Stainless Steel, you can make these promises in all good faith. People know what Stainless is, for they use it every day in the form of flatware, pots and pans, sink tops and the like.

The beauty is more than skin deep when you use trim made from service-tested USS Stainless Steel. There's a size and finish for every possible need.

See "THE UNITED STATES STEEL HOUR"—Televised alternate weeks—Consult your newspaper for time and station.

UNITED STATES STEEL CORPORATION, PITTSBURGH
AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

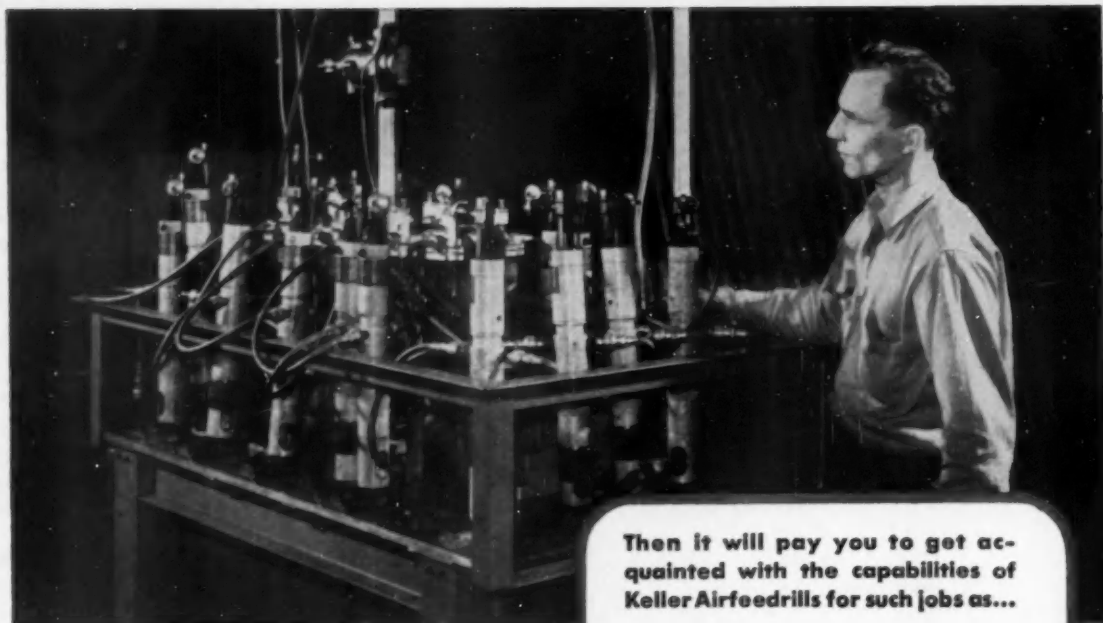
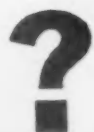
USS STAINLESS STEEL

SHEETS • STRIP • PLATES • BARS • BILLETS
PIPE • TUBES • WIRE • SPECIAL SECTIONS



UNITED STATES STEEL

Can automatic production help you improve quality . . . reduce costs



A typical automatic production setup using 14 Keller Airfeedrills. Pressing a single control valve drills 14 holes simultaneously in a refrigerator outer shell assembly—the drills advance, drill, retract, and shut off automatically.

■ These remarkable tools work without supervision, and take the place of expensive machines in automation setups. They are entirely air controlled and operated, automatically cycled, and extremely accurate.

■ Among the special advantages available are sensing type rapid advance, hydraulic feed control, and adjustable torque control. Thus they are able to do peck drilling, skip drilling, and other jobs that heretofore have required expensive machine tools.

■ Write and tell us about your machining problems. We will send appropriate bulletins or have a representative call to discuss Keller Air Tools.

Then it will pay you to get acquainted with the capabilities of Keller Airfeedrills for such jobs as...

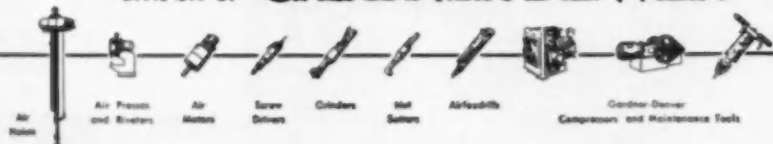
- **DRILLING**
- **REAMING**
- **COUNTERSINKING**
- **TAPPING**
- **CENTER DRILLING**
- **CHAMFERING**
- **COUNTERBORING**
- **SPOTFACING**

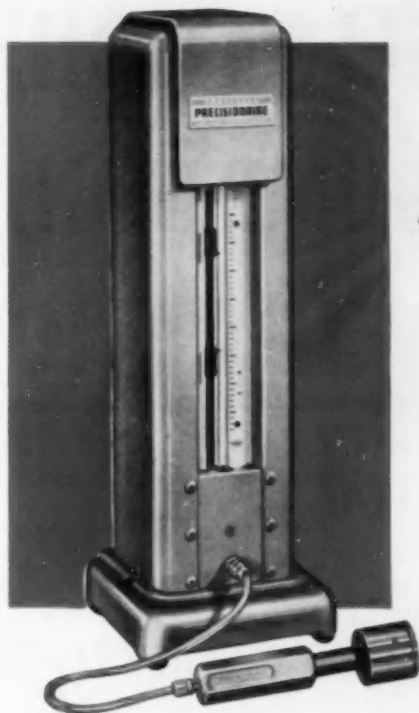


KELLER TOOL

DIVISION OF **GARDNER-DENVER**

GRAND HAVEN, MICHIGAN





A CHANGE IN WORK PART TOLERANCE

Doesn't Obsolete YOUR PRECISIONAIRE

Immediate conversion to meet an engineering change, a shift from one part to another or a change in tolerance or processing—is an unequalled and exclusive advantage of Precisionaire Column Instruments.

For instance, should the .0005 tolerance of parts being checked with a 10,000 or 5,000 Column Instrument, be changed to .002, a new instrument is not required. Merely change over the Precisionaire with a 1,000 or 2,000 Conversion Kit in less than three minutes.

The Precisionaire Column Instrument is always usable this minute, an hour, a week, a month or a year from now, with any appropriate gaging elements, regardless of shifting tolerances, changes in processing and engineering and changeover from one part to another.

NO OTHER AIR GAGE HAS THIS IMMEDIATE FLEXIBILITY—Precisionaire Column Instruments are always usable. They are the most universal in use—and the most universally used.

Learn more about the spectacular versatility and economy of Precisionaires—call your Sheffield Representative or phone, wire or write Dayton for a showing of automatic sound slide films on air gaging—they can be shown on your desk.

Gage Division, The Sheffield Corporation,
Dayton 1, Ohio, U.S.A.

See us at the Machine Tool Show, Booth 1305

4767



COLUMN

SCALES

FLOAT

BUFFER



SHEFFIELD

FOR FASTER ACCELERATION, LOWER FUEL CONSUMPTION, WITH THE SAME AXLE RATIO

It's an engineering fact that a 10% change in car weight has the effect on acceleration of a .4 change in the numerical rear axle gear ratio.

A decrease in weight is the one sure means of obtain-

ing faster acceleration and lower fuel consumption without changing axle ratio.

For example, a 10% decrease means a proportionate reduction in fuel consumption.

...think of *Kaiser Aluminum*

FOR CARS that are far lighter in weight—and have equal or superior strength to cars built with heavier ferrous or copper base metals—specify parts made with Kaiser Aluminum.

Many tested and proved parts made with Kaiser Aluminum—like those shown below now in use—are available today to give you the important benefits of lighter weight.

Aluminum parts give superior performance and service through aluminum's unique combination of properties, including light weight with strength, corrosion resistance, heat conductivity, light and heat reflectivity.

Initial costs are generally less, because *lightweight*

aluminum gives you up to *three times* more metal per pound. In production, the workability of aluminum makes it easy and economical to stretch, roll, cast, draw, forge, spin, stamp, extrude, or machine.

As America's fastest growing major producer of aluminum, we are ideally equipped to work with you. Our Product Development and Research Services can give you valuable assistance in designing aluminum automotive parts. A Kaiser Aluminum engineer will be glad to work with you immediately. Contact Kaiser Aluminum & Chemical Sales, Inc. *General Sales Office*, Palmolive Building, Chicago 11, Illinois. *Executive Office*, Kaiser Building, Oakland 12, California.

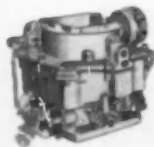
These aluminum automotive parts have been proved superior
—and there are more on the way!



Flywheel housing



Battery Cable



Carburetor and components



Automatic transmission plate



Grills



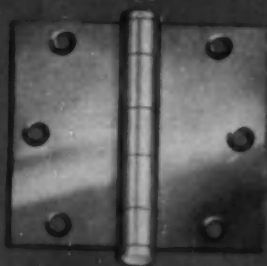
Instrument Panel



Wheels

Better Automobiles . . . Through Better Engineering . . . with Kaiser Aluminum!

CrysCoat*



MOVES IN THE BEST CIRCLES

**The Oakite CrysCoat
Cleaning-Phosphating Process
for preparing metals for painting*

THE NATIONAL LOCK COMPANY—"all from one source" supplier to leading American automotive, appliance, furniture and building industries—demands the best for its customers. That's why even builder's butt hinges are CrysCoated to make the paint finish look better . . . last longer.

There's an Oakite CrysCoat Process to suit your particular set-up:—

1. Zinc phosphating in spray washer
2. Zinc phosphating in tank
3. Iron phosphating in spray washer
4. Iron phosphating in tank

Each CrysCoat Process gives you a fine phosphate foundation for long-lasting paint adhesion.

Each CrysCoat Process protects against corrosion under the paint.

Each CrysCoat Process is easy to control.

Each CrysCoat Process is solidly backed by nationwide Oakite Service that unconditionally guarantees satisfaction.

Illustrated literature describing the Oakite CrysCoat Cleaning-Phosphating Process gladly mailed on letterhead request.

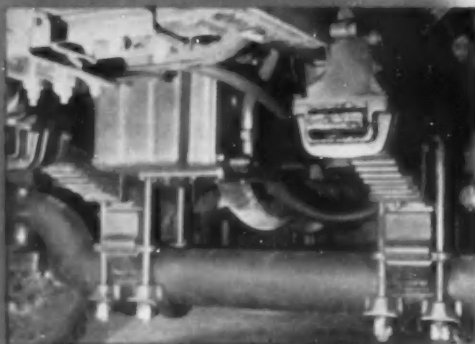
Oakite Products, Inc., 14F Rector St., New York 6, N. Y.



*CrysCoated Products
Look Better . . . Last Longer!*

Technical Service Representatives Located in Principal Cities of United States and Canada

"Where performance **Really Counts!**"



Heavy motor transport . . .
on and off the highway . . .
calls for the ultimate in
performance from
men and their machines

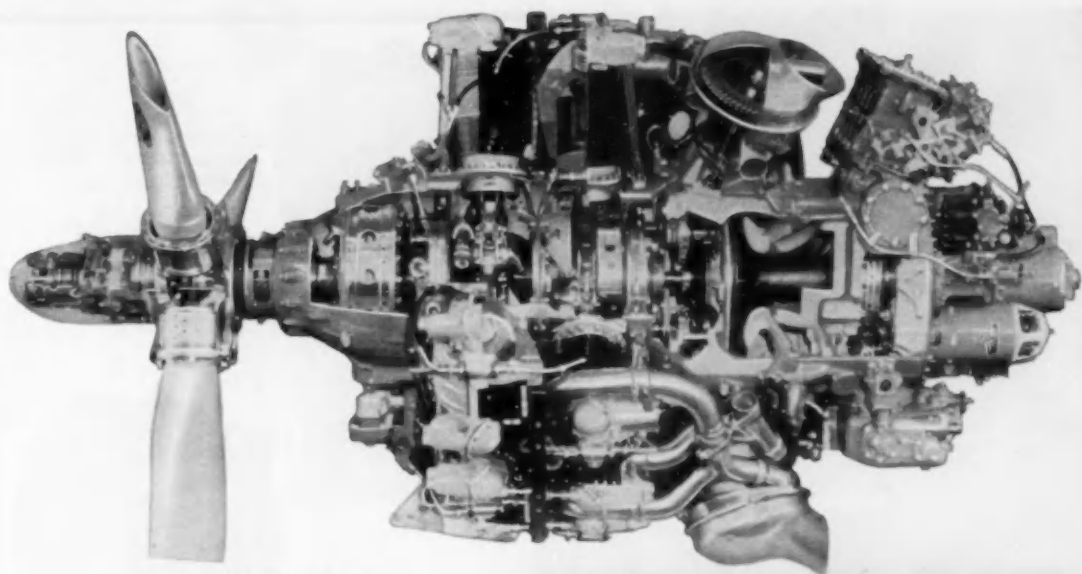
BURTON

AUTO SPRING CORP.

Vital Support for the Automotive Industry
Western Avenue at Forty-eighth Street
Chicago 32, Illinois

Here's where performance really counts . . . and especially in the springs that cushion the shocks and carry the weight of vehicle and load. Where service is not easily available . . . parts and labor sources remote . . . and heavy tonnage in the balance, the time proven dependability of BURTON SPRINGS is an indispensable advantage. Burton "high-stability" springs as featured by Autocar, shown above in the service of a Texas contractor.

The services of Burton Auto Spring Corporation, with modern plant, adequate capacity, and highly qualified engineering staff is at YOUR disposal. Write us about your spring requirements now.

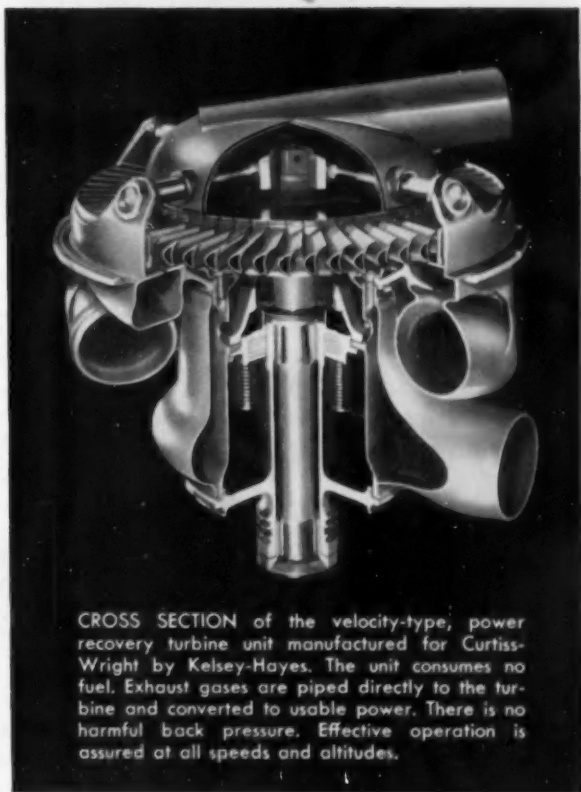


CURTISS-WRIGHT
Turbo Compound Engines
are in use by 30 World Airlines
plus leading military aircraft

Kelsey-Hayes helps put 20% power bonus into Curtiss-Wright engines

*One more example of
Kelsey-Hayes diversity at work for
major industries throughout America*

Any way you translate it—20% longer range, 20% less fuel, 20% more payload—power recovery turbines on the Curtiss-Wright Turbo Compound engine mean greater operating economy. The entire power recovery unit—requiring 2000 close tolerance machining operations—is manufactured to highest engineering standards by the Kelsey-Hayes Wheel Company, Detroit 32, Michigan.



CROSS SECTION of the velocity-type, power recovery turbine unit manufactured for Curtiss-Wright by Kelsey-Hayes. The unit consumes no fuel. Exhaust gases are piped directly to the turbine and converted to usable power. There is no harmful back pressure. Effective operation is assured at all speeds and altitudes.

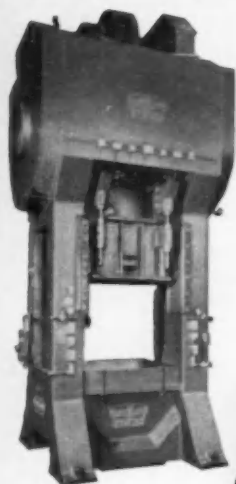
KELSEY HAYES

World's Largest Producer of Automotive Wheels

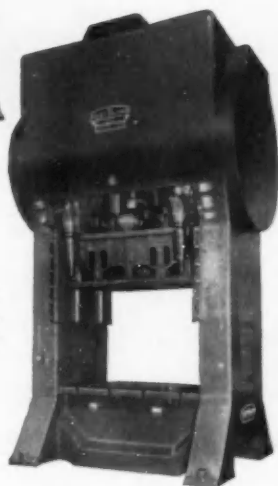
Wheels, Brakes, Brake Drums, Special Parts for all industry • 9 Plants — Detroit and Jackson, Mich. . . . McKeesport, Pa. . . . Los Angeles . . . Windsor, Ont., Canada . . . Davenport, Ia. (French & Hecht Farm Implement and Wheel Div.)



Cleveland-Double
Crank Double Action
Toggle Press—
400-ton capacity



Cleveland Single Crank
Double Action Toggle
Press—200-ton capacity



Cleveland Double Crank
Double Action Toggle
Press—200-ton capacity

YOU'LL HAVE fewer DEEP DRAW OR STAMPING rejects WITH Cleveland Toggle Presses!

The design of Cleveland Double Action Toggle Presses assures *smoothness of action, perfect timing and absolute dwell of blank-holder slide*. Powerfully constructed and having an ample over-load capacity, they consistently produce difficult deep drawings and stampings accurately. You'll enjoy their trouble-free operation and simplified maintenance. Adjustments are easy.

Cleveland Toggle Presses are designed so that when

the blank-holder toggle arms straighten out, the entire blank-holder pressure is transmitted to the frame. This permits total use of crankshaft power for the drawing operation.

Before you buy your next press, won't you let us give you the complete Cleveland story? We make 11 types of Cleveland Presses to assure utmost stamping economy. Just write or call today!

Why Settle for Less than a Cleveland Press

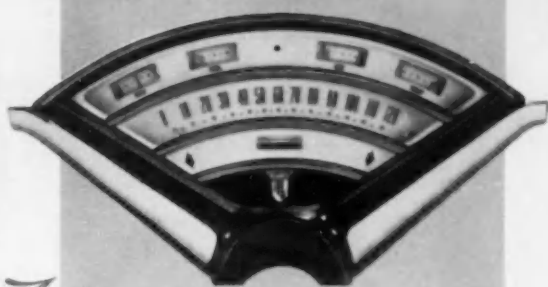


POWER PRESSES
FABRICATING TOOLS

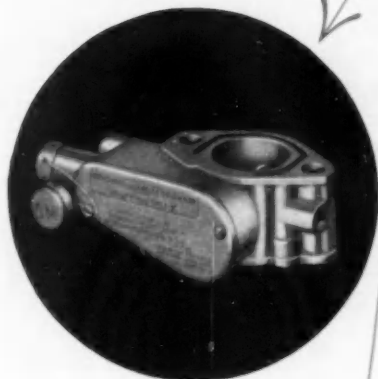
E. 40TH & ST. CLAIR AVENUE • CLEVELAND 14, OHIO
Offices at: NEW YORK • CHICAGO • DETROIT • PHILADELPHIA • E. LANSING • OXFORD, O.
CITY FOUNDRY DIVISION • SMALL TOOL DEPARTMENT



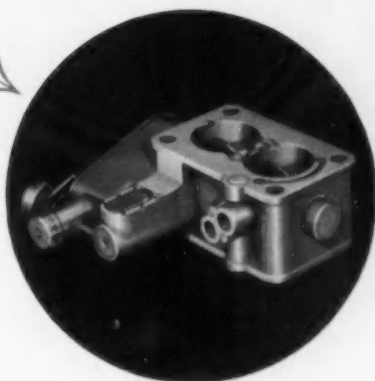
K-S
products are
STANDARD
in the
Automotive
Industry



**INSTRUMENT
CLUSTER**



**VARI-SPEED
GOVERNORS**



DIESEL GOVERNOR

King-Seeley automotive dashboard instruments, instrument clusters and governors have been very widely used on passenger cars and trucks for the past 28 years. Among the important reasons are:

- The K-S Research Division works continuously in the development of better designs and more effective processing.
- All K-S products are manufactured under a formal chart system of statistical quality control to assure maximum uniformity and dependability.

When you standardize on these products you provide equipment for your customers consistent in quality with the vehicles you produce.

7173

KING-SEELEY CORPORATION
ANN ARBOR, MICHIGAN



ALL NEW

Lodge & Shipley 10" HI-TURN LATHE

PERFECTED FOR PRODUCTION!

*... never before ... so many features ...
so much quality ... at such low cost!*

- 9 color-coded speeds up to 3000 RPM and 5 HP
- Totally enclosed quick change gear box
- Dynamically braked motor in leg
- Template-type length stops, magnetic clutch operated
- Flame-hardened replaceable steel bedways
- Hardened and ground cross slide ways
- Direct reading cross feed and top slide dials
- Provision for rear tool block and multiple tools

The Lodge & Shipley 10" HI-TURN Lathe is a completely new concept in lathes. Establishing that lathes for high speed production rarely utilized lead-screws, Lodge & Shipley eliminated the leadscrew and its complicated gearing . . . added other features for high production and accuracy at low cost. The result is a rugged lathe of high efficiency at a price substantially lower than conventional lathes.

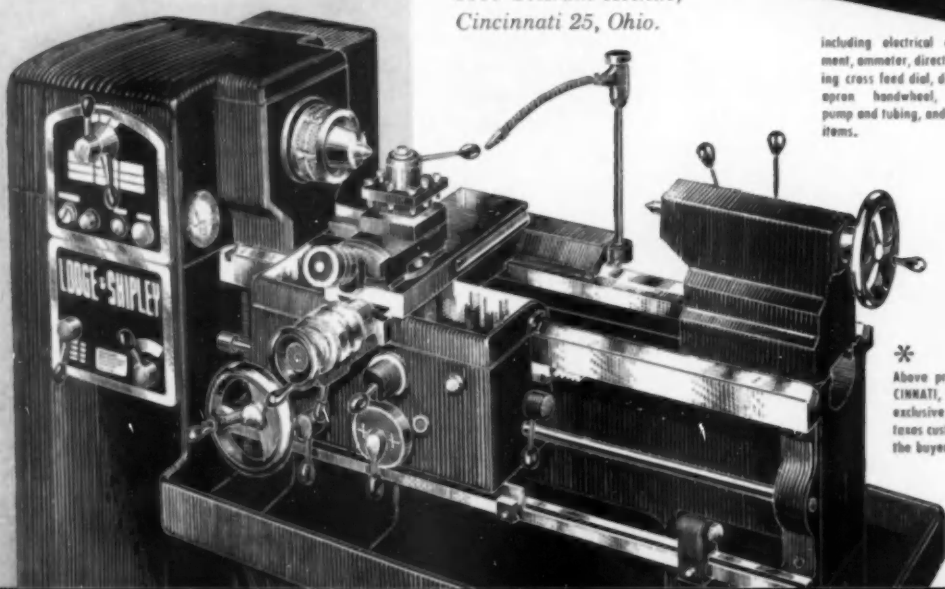
Write for detailed Bulletin 300,
The Lodge & Shipley Co.,
3055 Colerain Avenue,
Cincinnati 25, Ohio.

only
\$4,985*

including electrical equipment, ammeter, direct reading cross feed dial, dial for apron, handwheel, pan, pump and tubing, and other items.

*

Above price is for CINCINNATI, OHIO and is exclusive of applicable taxes customarily paid by the buyer.



SEE IT NOW! and SEE IT AT THE MACHINE TOOL SHOW, SEPTEMBER 6-17



Hot off the mill

These glowing bars, hot off the 12-in. mill at our Lackawanna plant, will soon be on their way to a well-known automotive producer. But first, the sample being cut off must be carefully checked for size and section—the final step in a long series of quality controls that began in the raw material yards and continued through every step of the steelmaking process.

Critical tests and inspections all along the line are one reason why you can rely on Bethlehem carbon-

steel bars to measure up to the finest the industry has to offer.

We particularly invite your consideration of the amazingly wide variety of special sections produced by Bethlehem. The use of special sections, hot-rolled precisely to your drawings and specifications, might substantially reduce your production costs, and give you a better product in the bargain.

Bethlehem carbon-steel bar products rolled at our Lackawanna, N. Y., and Johnstown, Pa., plants include

standard sections, special sections and bar-size shapes. Also semi-finished products: blooms, billets and slabs.

Would you like to have further information? We suggest that you phone or write the Bethlehem sales office nearest you.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL



EFFICIENT... FLEXIBLE... COMPACT

Murray-Way's New #55 Head

GIVES YOU THESE POLISHING AND BUFFING ADVANTAGES:

GUARANTEED SPINDLES—All Murray-Way 55 Spindles are **GUARANTEED FOR 3 YEARS**. Factory-tested spindles incorporate heavy-duty, anti-friction bearings that require no grease or oil and are sealed against dirt for trouble free performance.

RIGHT OR LEFT HAND OPERATION—By simply inverting the head assembly, the 55 Heads may be used for either right or left hand operation.

SMALL FLOOR SPACE—The 55 Series Heads will install in line on 5'8" centers. They conserve floor space, economize on conveyors, and reduce fixture requirements.

UNIVERSAL POSITIONING—With the Murray-Way adjustable fulcrum head, you get universal positioning by means of simple, accessible adjustment controls at the front of the head.

RUGGED—These heads are truly heavy-duty workhorses with 30 H.P. capacity.

FULL WORK CONTACT—On even the most irregular work shapes, Murray-Way's 55 Heads remain in constant contact—**NO EXTRA PASSES—LOWER OPERATING COST—MORE PRODUCTION.**

The technical know-how of Murray-Way's experienced engineers is the reason that production men who want a **BETTER WAY... SPECIFY MURRAY-WAY.**

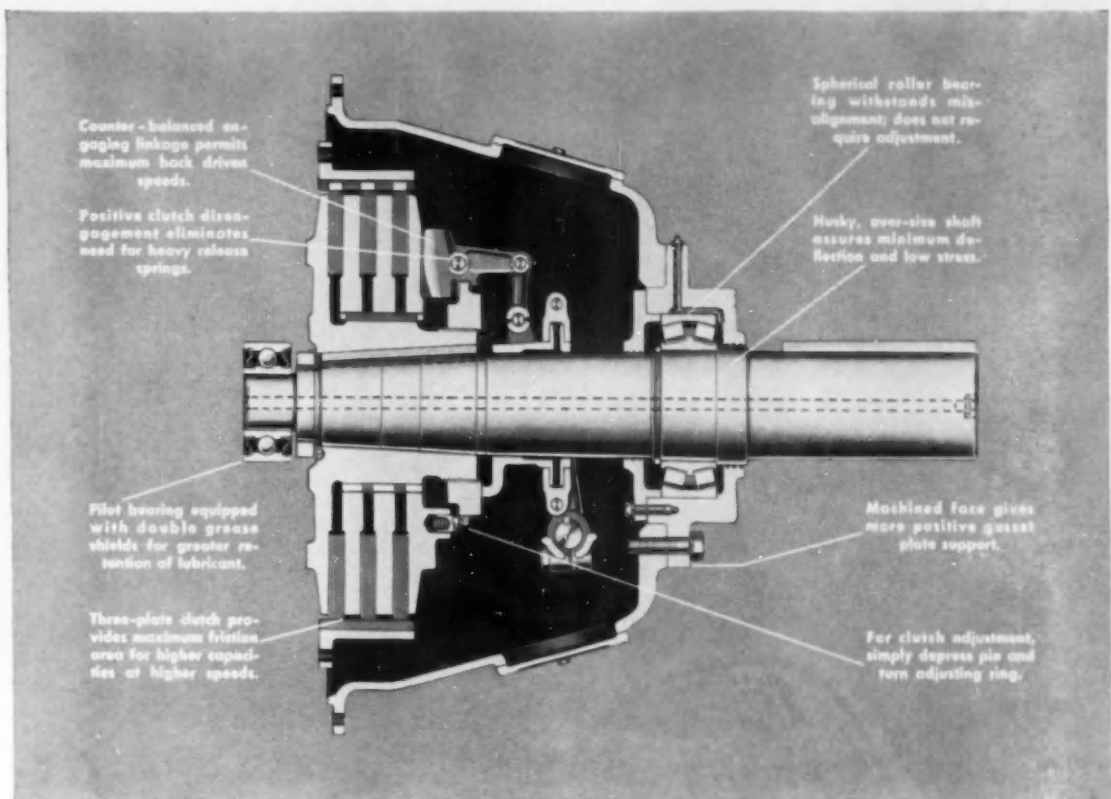
FOR COMPLETE INFORMATION WRITE



MURRAY-WAY CORPORATION

P. O. BOX 180, MAPLE ROAD EAST • BIRMINGHAM, MICH.

Polishing, Buffing, Grinding, Filtering Equipment that automatically cuts your costs.



A new Power Take-Off for higher-speed, higher-horsepower engines

Here is the all-new Twin Disc Model SP-318 heavy-duty Friction Power Take-Off—designed and engineered especially to meet the extra requirements of the new engines in the 350 to 375 hp range, operating up to 1800 rpm.

Extremely compact for its capacity, the new Twin Disc Power Take-Off is provided with an S.A.E. #0 fly-wheel housing. With triple driving plate construction, it assures ample friction surfaces to withstand high horsepower loads. And with solid driving plates, the new PTO effectively permits higher safe permissible speeds.

The pilot bearing of the new Power Take-Off is composed of a single row of balls, operating in bearing races of

double-row width . . . providing improved accommodation of minor misalignment inherent in installations of this nature. Pilot bearings of this type provide additional space for lubricant, which is more effectively retained by the double grease shield construction. Although this construction is usually referred to as "sealed for life," the clutch shaft is drilled to provide for relubrication of the pilot bearing in the usual manner.

Another outstanding feature of the new Twin Disc Power Take-Off is the use of a spherical bearing which does not require adjustment. With its inherent ability to permit angularity, the spherical bearing is more resistant to overload and destructive forces resulting from heavy side loads.

For complete information on the new Twin Disc SP-318 Friction Power Take-Off (and the SP-314, a smaller model of the same new design, for engines in the 225 hp range operating at 2200 rpm), write to the Twin Disc Clutch Company, Racine, Wisconsin.



TWIN DISC CLUTCH COMPANY, Racine, Wisconsin
Hydraulic Division, Rockford, Illinois

TAKE THE **NADELLA** ROAD

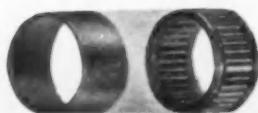
IT'S THE ROAD TO SUCCESS...

THE
FAMOUS
ORIGINATORS
OF
NEEDLE CARTRIDGES
AND
NEEDLE BEARINGS
WITH NEEDLE RETAINERS

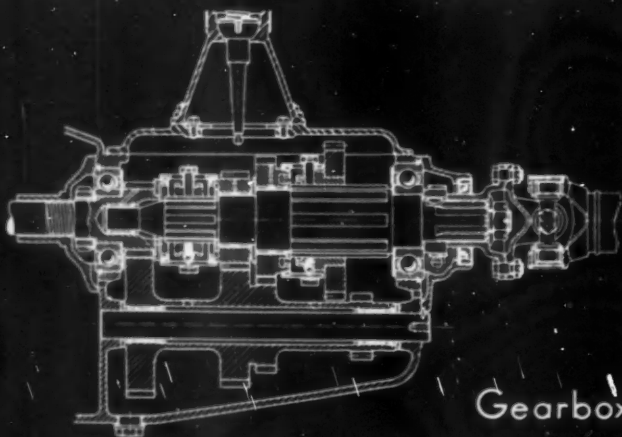
loose needles



needle cartridges



complete bearings



Gearbox

133 & 137 BOULEVARD NATIONAL

NADELLA

RUEIL-MALMAISON (S.O.) FRANCE

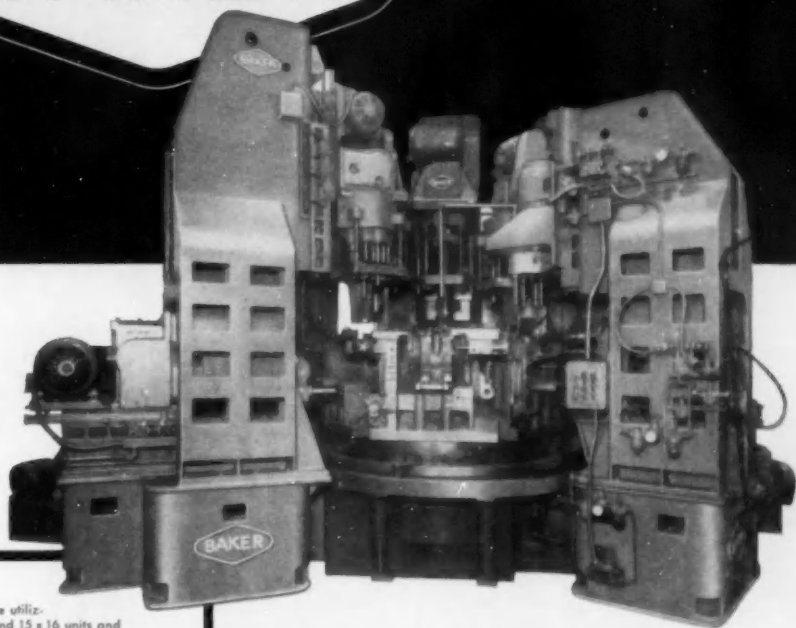
ANOTHER
COMPLEX
DRILLING PROBLEM

SOLVED

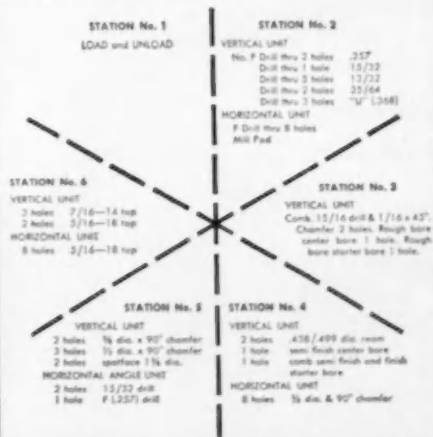
with a

by
BAKER

SPECIAL MACHINE



Baker Multi-Operation Machine utilizing standard Baker 7 1/2 x 16 and 15 x 16 units and a 72" six-station power indexing table, performs drilling, chamfering, boring, counterboring, and tapping operations on clutch housings at the rate of 80 parts-per-hour at 100% efficiency.



Baker Special Drilling Machines, composed of standard Baker units arranged to suit each individual problem, are designed for *productivity*. Units arranged in vertical, horizontal and angular planes perform multiple operations *faster . . . better . . . automatically . . .* with greater accuracy and efficiency. Consult Baker engineers for a better solution to your drilling problems.

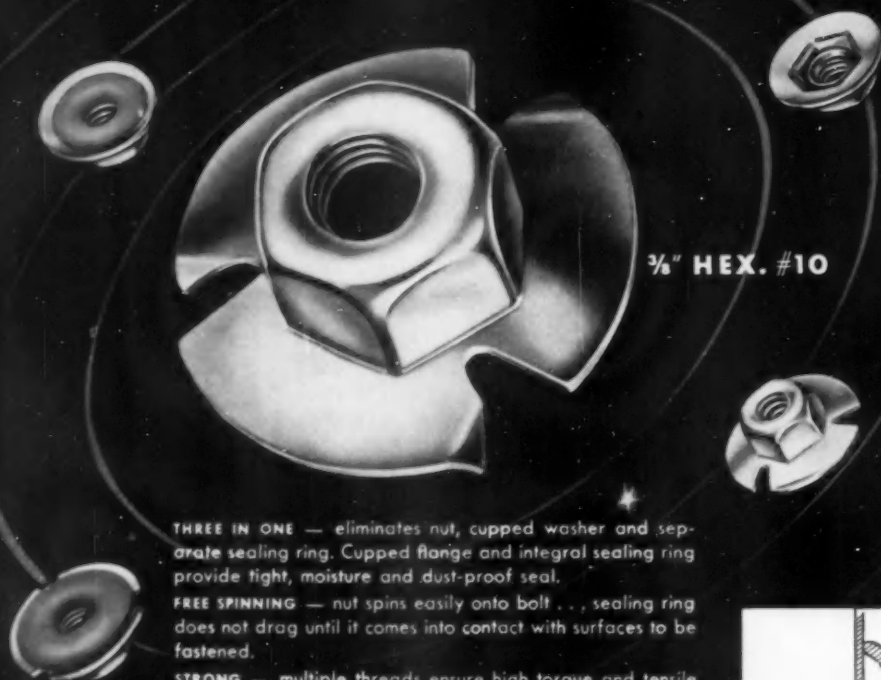
SINCE 1957

BAKER BROTHERS, INC. Toledo, Ohio
DRILLING...TAPPING...KEYSEATING and CONTOUR GRINDING MACHINES

NEW STAR...

A WASHER NUT

that locks and seals itself



$\frac{3}{4}$ " HEX. #10

THREE IN ONE — eliminates nut, cupped washer and separate sealing ring. Cupped flange and integral sealing ring provide tight, moisture and dust-proof seal.

FREE SPINNING — nut spins easily onto bolt . . . sealing ring does not drag until it comes into contact with surfaces to be fastened.

STRONG — multiple threads ensure high torque and tensile strength.

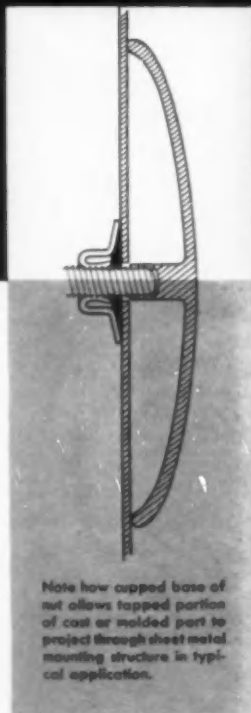
TWO FLANGE SIZES — $\frac{3}{4}$ " flange available with notches for extra locking power and positive grounding (shoulders bite into finish of parts to be fastened and prevent nut from vibrating loose). Both $\frac{3}{4}$ " and $\frac{1}{2}$ " flange available with or without sealing ring. (Locking type heat treated for extra tension.)

For further information on WASHER NUTS or any other problems involving special fasteners or self-fastening devices, contact your nearest United-Carr representative or write us direct.

UNITED - CARR

FASTENER CORPORATION • 31 Ames Street, Cambridge 42, Mass.

MAKERS OF **DOT** FASTENERS



Note how cupped base of nut allows tapered portion of cast or molded part to project through sheet metal mounting structure in typical application.

Makes the grade with flying colors

NOW you can get Allison TORQMATIC Converters in the fast-running, smoother-operating Austin-Western Super 88 Power Grader.

When you do you'll get a grader that's easier to operate because its TORQMATIC Converter cuts the number of shifts needed to complete a pass or make a cut—allows the operator to concentrate on his bladework.

You'll get a grader that costs less to operate because the TORQMATIC Converter automatically keeps the engine running in its most efficient power

range—broadens the engine's working ability by increasing engine torque $2\frac{1}{2}$ times—holds power to the load at all times.

And you'll get a grader that costs less to maintain, too. The TORQMATIC Converter provides a shock-absorbing hydraulic cushion that protects grader components from shock damage—boosts engine life by preventing engine lugging and stalling.

Allison's 200-300 Series TORQMATIC Converters in the Austin-Western Graders carry their own oil supply—have a simple dip stick to check oil

level. They're the first converter packages in the 40-150 horsepower range on the market with an integral oil cooler, sump and charging pump.

You can get Allison TORQMATIC Converters in a wide range of models for both gasoline or Diesel engines from 40 to 400 horsepower—TORQMATIC Transmissions for applications up to 300 horsepower. Ask your equipment manufacturer or dealer about Allison TORQMATIC DRIVES next time you buy or write for more information to Allison Division of General Motors, Box 894A, Indianapolis 6, Indiana.



Allison
TORQMATIC DRIVES

Zagar Gearless Drill Heads

put **4** big advantages to work for you



Any number of holes



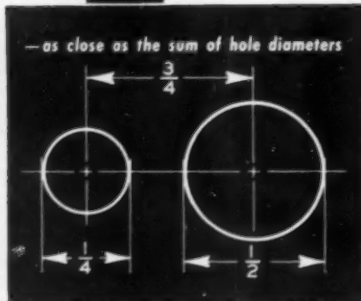
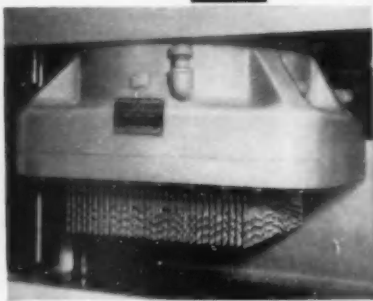
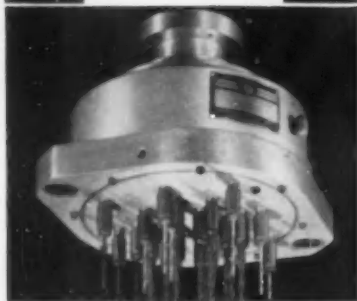
Any hole pattern



Any material



On all centers

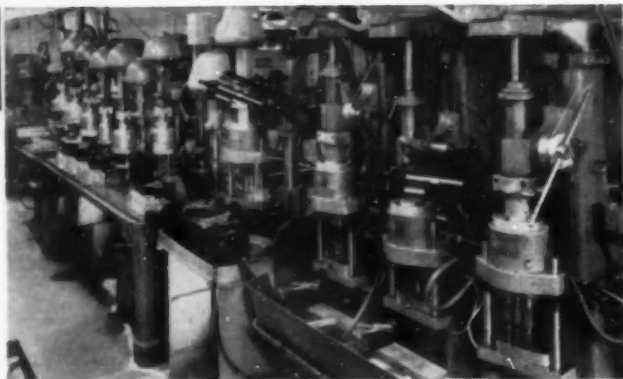


A Zagar drill head is never obsolete. Zagar can re-locate spindles for other hole patterns.

Can you visualize the savings made possible by drilling up to 1000 holes at one pass? Zagar standard practice can handle any machinable material up to 1 1/2" diameter. Holes of varying diameters can be drilled to form any pattern. Zagar Gearless Drill Heads, their efficiency proven by many years' success, can be installed on existing drill presses. Or, Zagar will lay out the necessary tooling for your entire job. May we see your sample parts and study your requirements? There is only one *right* answer—one *best* answer—for those requirements. May we supply it?

Let ZAGAR tooling plan the complete job for you

Whether your runs are long or short, let Zagar engineering survey your needs with a view to saving you the cost of special machines. In the case at the right two lines of *standardized* self-clamping drill jigs ream, tap and drill an aluminum die casting, both valve body and cover. The problem of limited production was readily solved. What, sir, are your requirements?



ZAGAR TOOL, INC. 24000 LAKELAND BOULEVARD, CLEVELAND 23, OHIO



TOOLS FOR INDUSTRY
and SPECIAL MACHINERY

Write for Technical
Data Sheets "U-7"
for more information.



"Wagner Air Brakes increase the service life of brake lining"



Says: R. H. WATKINS, Fleet Superintendent
TARBET TRUCKING, Inc., Muncie, Ind.

Every day WAGNER AIR BRAKES are helping more and more fleet operators establish finer records of safety and maintenance economy. These are some of the tangible advantages you can offer your customers by standardizing on WAGNER AIR BRAKES.

Much of the superiority of WAGNER AIR BRAKES is largely due to the engineering excellence that is built into every component part. WAGNER ROTARY AIR COMPRESSORS—standard on all WAGNER AIR BRAKE SYSTEMS—feature rotary motion, uniform torque load, oil separation and air cooling before discharge, high volumetric efficiency and easy, infrequent preventive maintenance. WAGNER BRAKE APPLICATION VALVES provide smooth, easy stopping. WAGNER RELAY EMERGENCY VALVES assure maximum trailer breakaway protection and eliminate the necessity of moving large volumes of air through long air lines.

All this is the result of more than thirty years of knowledge gained by WAGNER from the manufacture of brakes and complete brake systems.

Because of the ever-increasing demand for greater road and cargo safety and maintenance economy, it will pay you to include WAGNER AIR BRAKES as standard equipment on the vehicles you manufacture.

Send for your free copy of Wagner Bulletin KU-201 for full information and complete details. It will be sent to you without cost or obligation. Mail your request, today.

TARBET TRUCKING, INC.

311 EAST 16TH STREET
MUNCIE, INDIANA

ADDRESS ALL
CORRESPONDENCE TO:

Wagner Electric Corporation
6400 Plymouth Avenue
Saint Louis 14, Missouri

Gentlemen:

In 1953, our company was awarded the National Fleet Safety Award for the 2 to 3 million mile class. This award is indicative of the way we operate our fleet and the high performance standards we require of the equipment and material we use.

I can definitely tell you that Wagner Air Brakes help us maintain our safety record. Their superior quality and operating dependability are features of Wagner Air that I like. They are quiet and the compressors last 2 to 2½ times longer with normal preventive maintenance. Also, Wagner Air Brakes increase the service life of brake lining 3 times.

We plan to continue our policy of specifying Wagner Air Brakes when ordering new equipment and will keep recommending your air brakes to other fleet operators.

Sincerely yours,

R. H. Watkins
R. H. Watkins
Fleet Superintendent

WAGNER AIR BRAKE USERS

ARE OUR BIGGEST BOOSTERS

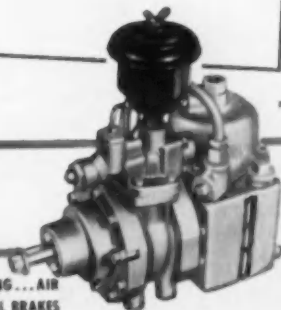


Wagner Electric Corporation

6363 PLYMOUTH AVENUE • ST. LOUIS 14, MO., U. S. A.

(Branches in Principal Cities in U. S. and in Canada)

LOCKHEED HYDRAULIC BRAKE PARTS and FLUID...NoRot...CoMoX BRAKE LINING...AIR BRAKES...TACHOGRAPHS...ELECTRIC MOTORS...TRANSFORMERS...INDUSTRIAL BRAKES



K55-118

Quantity
PRODUCTION
of
GREY IRON CASTINGS

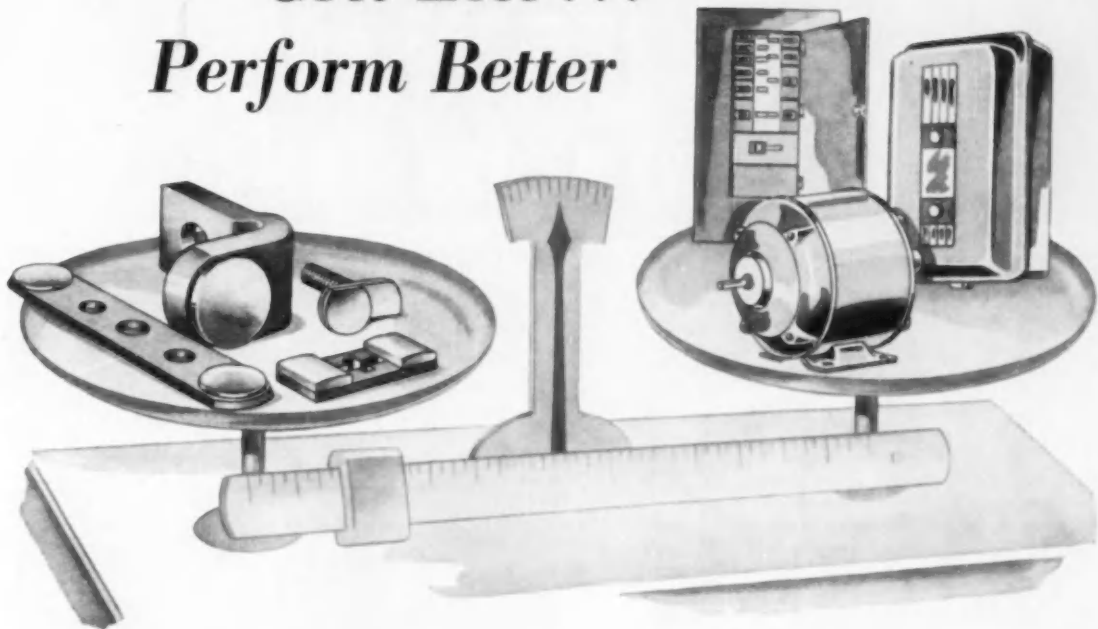
*
**ONE OF THE NATION'S
LARGEST AND MOST MODERN
PRODUCTION FOUNDRIES**

*
ESTABLISHED 1866
THE WHELAND COMPANY
FOUNDRY DIVISION

**MAIN OFFICE AND MANUFACTURING PLANTS
CHATTANOOGA 2, TENNESSEE**

Contacts BALANCED to Their Job

*Cost Less . . .
Perform Better*



Balanced design pays dividends in the electrical contacts you use in your product. *Under-designing* of contacts can detract from the performance of your product and lead to troublesome, costly maintenance. *Over-designing* makes your contacts cost too much for the job they must do . . . and subtracts from your profits.

To engineer contacts to the specific requirements of your application, important environmental factors must be precisely weighed. Current and voltage to be interrupted . . . nature of the load circuit . . . anticipated life . . . number and frequency of make-and-break cycles . . . contact pressure and gap . . . ambient temperature and atmosphere . . . all demand careful consideration.

To be sure of getting contacts that meet all these requirements . . . at a cost that matches your application . . . bring your contact problems to Mallory. During more

than thirty years of working with leading manufacturers of varied types of equipment, Mallory has developed not only an unequalled line of contact materials, but also a broad background of experience in contact design.

Our engineers will be glad to investigate your problem . . . to recommend the most effective Mallory contact material. Perhaps one of the many Mallory *standard* designs will meet your requirements. If not, Mallory engineers are well qualified to develop a *special* contact for your purpose. You can probably make additional savings, too, by having Mallory fabricate complete contact assemblies in our integrated manufacturing department.

Write today for a consultation with a Mallory engineer, and for a copy of our latest Contact Catalog.

Expect more . . . Get more from

Serving Industry with These Products:
Electromechanical — Resistors • Switches • Television Tuners • Vibrators
Electrochemical — Capacitors • Rectifiers • Mercury Batteries
Metallurgical — Contacts • Special Metals and Ceramics • Welding Materials

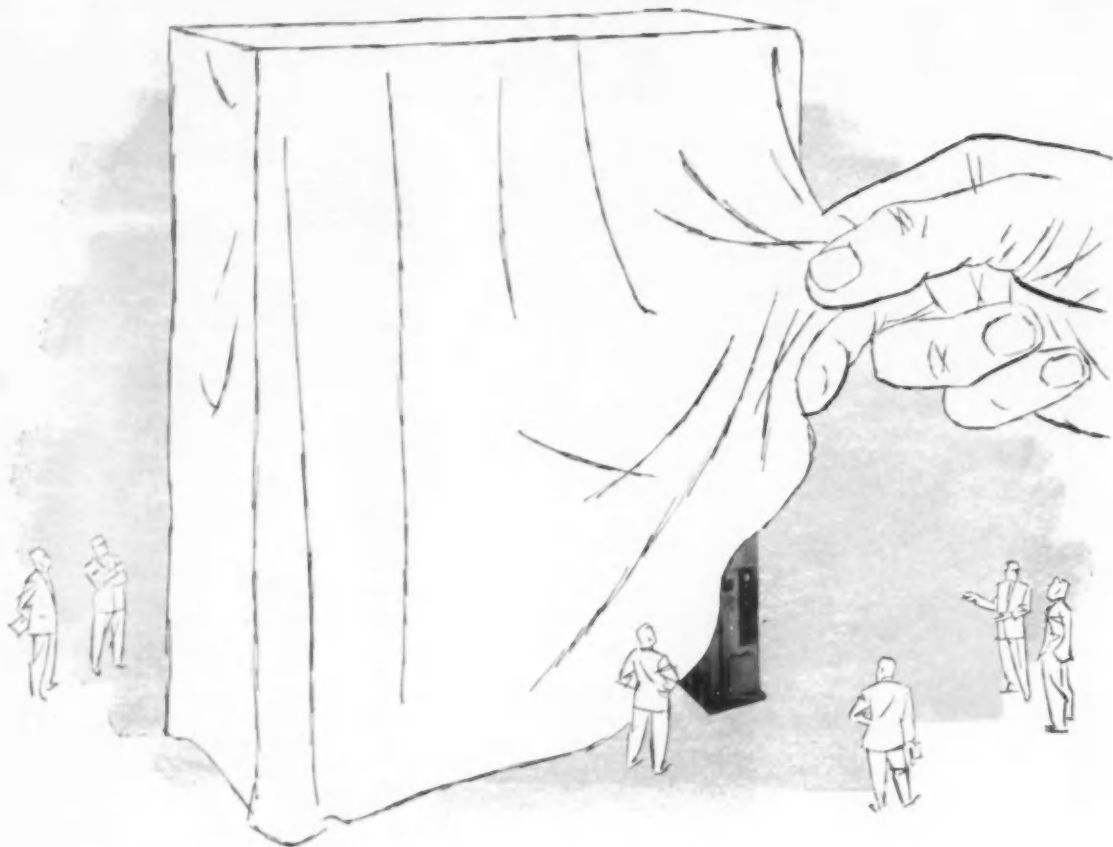
P. R. MALLORY & CO. INC.
MALLORY
P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

YOU ARE CORDIALLY INVITED TO THE



OPEN HOUSE

September 6 to 17



and the Unveiling of the Largest Double-Action Mechanical Press in the World

While in Chicago, during the Machine Tool Show, be sure to visit the Verson plant. Verson presses will be in operation for your examination in our new Research, Development and Exhibit Center.

Unveiling and presentation of the new Verson double-action mechanical press, the largest in the world, will take place

during the Open House. It's the one event that you don't want to miss while in Chicago.

Write today. Plan your trip to the Verson Open House now. We will be pleased to arrange transportation for you between the Show, or your hotel, and the Verson plant.

A Verson Press for every job from 60 tons up.



ORIGINATORS AND PIONEERS OF ALLSTEEL STAMPING PRESS CONSTRUCTION

VERSON ALLSTEEL PRESS CO.

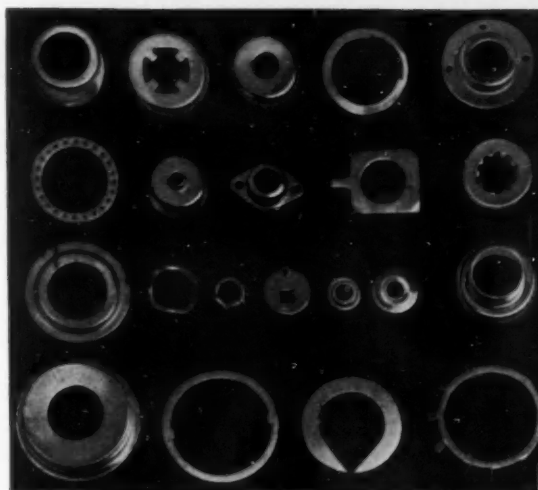
9307 S. KENWOOD AVENUE, CHICAGO 19, ILLINOIS • SO. LAMAR AT LEDBETTER DRIVE, DALLAS, TEXAS

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES • TOOLING • DIE CUSHIONS • Verson-WHEELON HYDRAULIC PRESSES

LEADERSHIP Backed by
68 Years of Continuous Service
to American Industry

MILWAUKEE WROT WASHERS

**SINCE
1887**



Our equipment for handling contract production of stampings includes presses for blanking, forming, drawing, shearing and extruding. In many cases it is possible to produce stampings at a lower cost than they can be produced in your own plant, with our own equipment. Our own tool and die-making shop enables us to make up the necessary tools to fit your specifications.

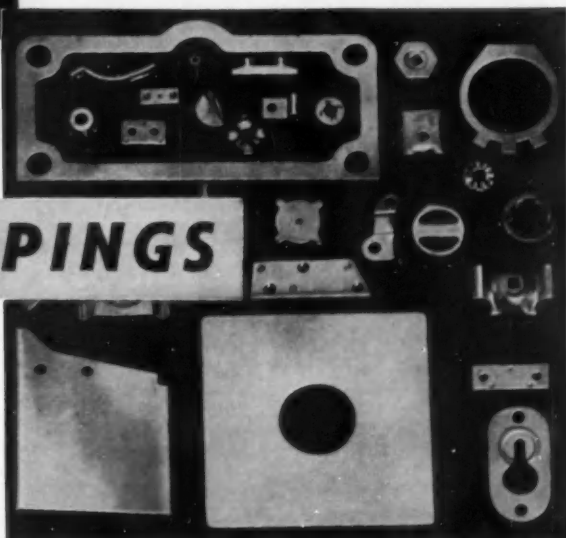
We are equipped to furnish stampings in any desired materials and finishes, ranging in size from small parts to large heavy-gauge pieces. Our engineering staff will be glad to co-operate with you in every way consistent with economical and efficient production.

• • •

Send us your blueprints for quotations on special washers and stampings made to your individual specifications. Write for copy of 76-page Catalog "30" with tool list and complete round washer specifications.

In terms of "satisfaction to the customer" the dominant leadership of Wrought Washer Mfg. Company in this specialized field represents not only a thoroughly dependable source of supply to meet all your requirements for Standard and Special Washers, but of equal importance, it carries with it a wealth of technical know-how dealing with a wide variety of production and design problems . . . available to you as a gratis service. More than 25,000 sets of dies "in stock" at our plant offer the greatest range of selectivity.

STAMPINGS

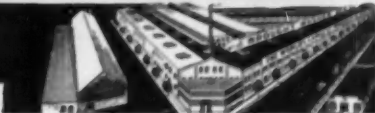


WROUGHT WASHER MFG. CO.

THE WORLD'S LARGEST PRODUCER OF WASHERS

2212 SOUTH BAY STREET

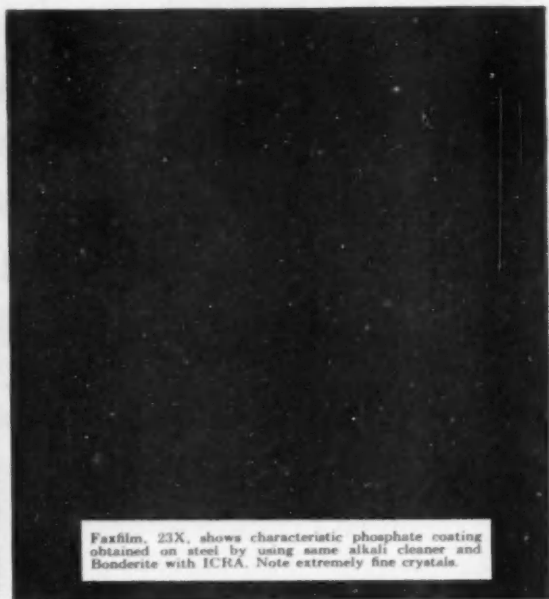
MILWAUKEE 7, WISCONSIN



A8247-IP



Faxfilm, 23X, shows characteristic phosphate coating obtained on steel by using conventional alkali cleaner followed by phosphating material without ICRA. Note size of crystals.



Faxfilm, 23X, shows characteristic phosphate coating obtained on steel by using same alkali cleaner and Bonderite with ICRA. Note extremely fine crystals.

New Bonderite 800 series contains I C R A

(INTERNAL CRYSTAL REFINING AGENT)

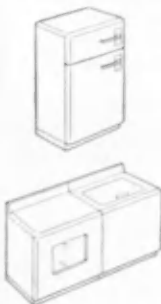
Built-in improved performance!

In the new Bonderite 800 Series, Parker presents a great new development in zinc phosphate coating. ICRA—Internal Crystal Refining Agent—produces a denser coating with finer crystalline structure. Use it on steel surfaces, and on zinc surfaces, such as galvanized, zinc base die castings, and electrogalvanized in mixed production with steel.

The very smooth, continuous phosphate surface produced by 800 Series Bonderites makes for exceptional evenness of paint penetration, with greater uniformity of paint luster. Metal coated with 800 Series Bonderites may be rubbed, bent or flexed without loss of coating bond. This means better adhesion of paint, also.

Many types of Bonderite with ICRA are available in the 800 Series. You can choose the one best suited to your needs as to method of application, processing time and temperature, and coating weight.

Get full information on Bonderite 800 Series with ICRA. Call or write today.



Use **BONDERITE**
to preserve appearance of finest
painted products

*Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.



PARKER RUST PROOF COMPANY

2178 E. Milwaukee, Detroit 11, Michigan

BONDERITE
inversion resistant
paint base

BONDERITE and BONDERLUBE
aids in cold forming
of metals

PARCO COMPOUND
rust resistant

PARCO LUBRITE
water resistant for friction
surfaces

TROPICAL
heavy duty maintenance
paints since 1883

OVERHUNG ROTOR DESIGN

simplifies compressor installation and eliminates outboard bearing alignment problems

1 PERMANENT, BUILT-IN ALIGNMENT

Rotor support bearing cast integral with crankcase.

2 NO OUTBOARD BEARING

No alignment problems.

3 FLOATING ROTOR

While operating, rotor weight is supported on a cushion of magnetic force.

4 EASE OF INSTALLATION AND MAINTENANCE

Just set the stator down and slide it in place.

5 NO FLYWHEEL REQUIRED

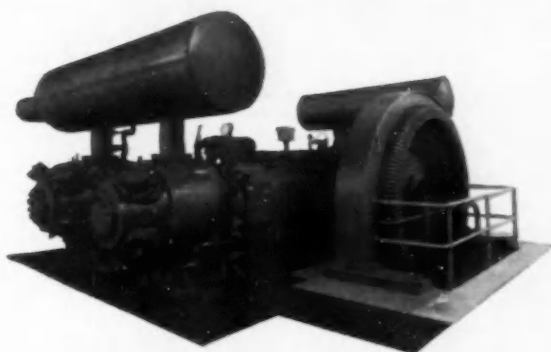
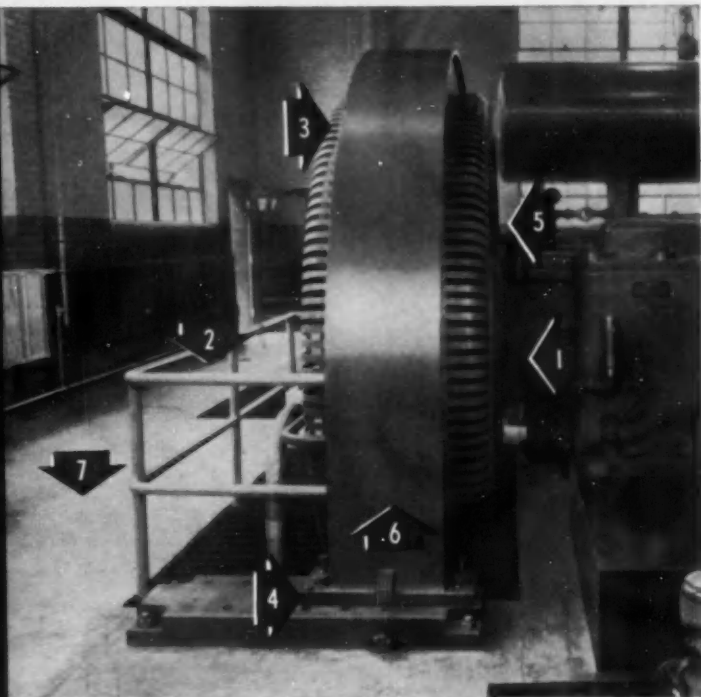
Flywheel effect built into rotor.

6 ONE-PIECE STATOR

Elimination of stub shaft and outboard bearing permits use of one-piece stator and collector rings.

7 SAVES FLOOR SPACE

Close coupling reduces foundation size and floor area.



CLARK BROS. CO. • OLEAN, N. Y.

ONE OF THE DRESSER INDUSTRIES

Sales Offices in Principal Cities throughout the World

One of the many exclusive features of Clark Balanced/Opposed Compressors is the overhung rotor design.



With it, compressor installation is greatly simplified, floor space requirements are substantially reduced and alignment problems (inherent with outboard bearings) are non-existent. Furthermore, elimination of the outboard bearing precludes bumping it out of alignment.

When the unit is operating, the magnetic lines of force fully support the rotor, with practically no weight carried by the integral bearing or shaft. Alignment is permanently built into Clark Balanced/Opposed Compressors.

For complete details on America's first and foremost Balanced/Opposed Motor-Driven Compressor—the compressor with *perfect balance*—write for Bulletin 118 and consult with your nearest Clark representative.

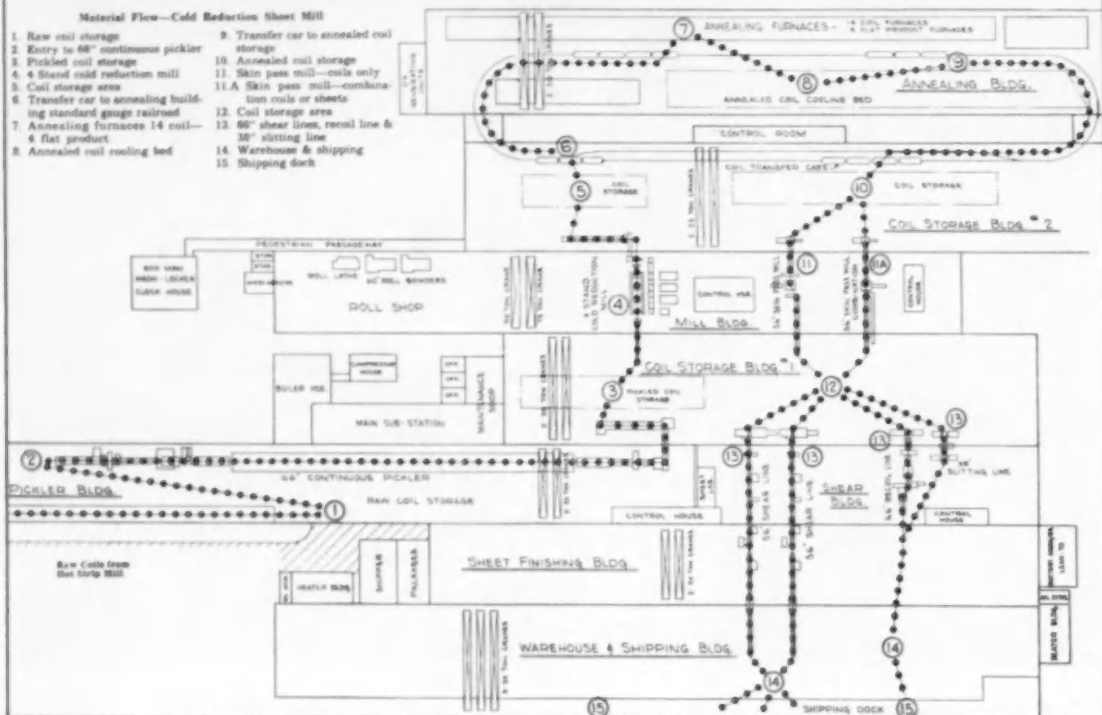
PRECISION BY THE TON

CLARK

balanced/opposed compressors

150-4500 HP

How we use 7 buildings to process quality into cold rolled sheets and strip



Flow diagram shows Youngstown's cold reduction sheet mill at East Chicago. These facilities mean customers can reduce inventories, get quick delivery on sheet and strip they need.

● Coils come rolling in from the hot strip mill. They've been carefully watched from the time they were ingots and slabs. Now, they're ready to be cold reduced. And the same care that went into making the original steel goes into each step of the process that takes place in these seven buildings. The result: the quality sheet and strip you always expect, and get, from Youngstown. And better fabricated products for you.



**COLD ROLLED
SHEETS AND STRIP**

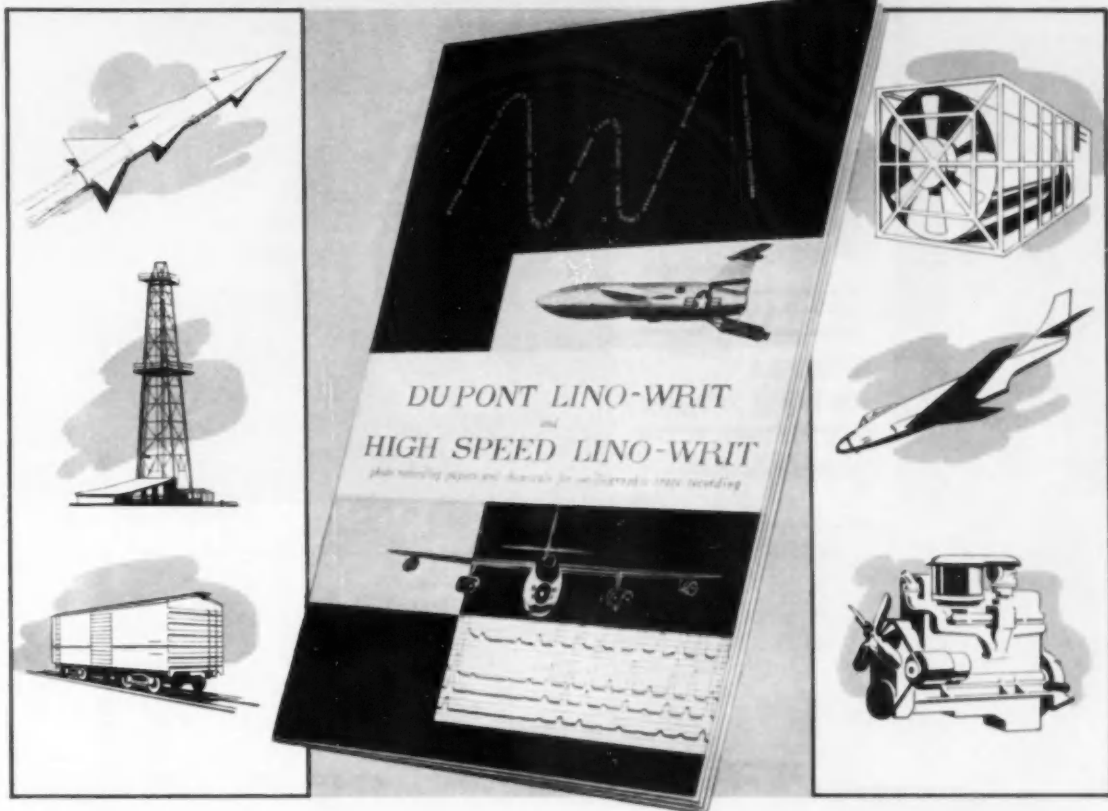
THE YOUNGSTOWN SHEET AND TUBE COMPANY

General Offices: Youngstown, Ohio - District Sales Offices in Principal Cities

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - BAR SHAPES - WIRES - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - RAILROAD TRACK SPIKES

Manufacturers of
Carbon, Alloy and Yalco Steel

FROM DU PONT:



A new guide to help you select recording paper that's right for the job

Oscillograph recordings are playing new and varied roles in today's expanding technology. To help you find the photo recording paper best suited to your particular need, Du Pont has prepared a new booklet on LINO-WRIT and HIGH SPEED LINO-WRIT.

This comprehensive six-page guide

gives all the information you need to use these dependable Du Pont photo recording papers. Prices, sizes, speeds and other basic data on LINO-WRIT and HIGH SPEED LINO-WRIT are listed in easy-to-read table form.

Also included is a description of processing—from the time a box of LINO-WRIT is opened until the ac-

curate, high-contrast trace record is dry and ready for evaluation.

Discover how you can get fast, clean recordings—under normal or abnormal testing conditions—with LINO-WRIT (for normal speeds) and HIGH SPEED LINO-WRIT (for highest "writing" speeds). Just mail coupon today for your free booklet.

DU PONT OSCILLOGRAPHIC PRODUCTS



BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Photo Products Department
Room 2496, Nemours Bldg., Wilmington 98, Del.

Please send me the free, informative booklet on LINO-WRIT and HIGH SPEED LINO-WRIT. I am particularly interested in

☐ Seismic data ☐ Mass spectrometry ☐ Dynamic measurement

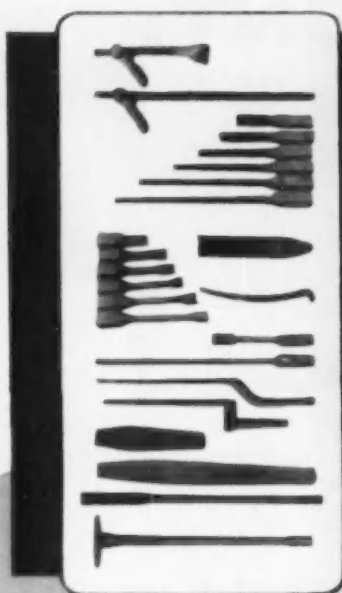
Name _____

Firm _____

Street _____

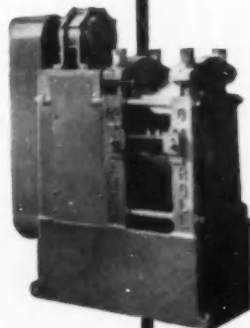
City _____

State _____



forge shops need AJAX forging rolls

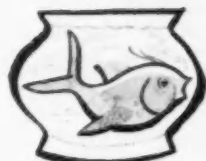
Though they are simple in principle and simple in operation, Ajax Wide Adjustment Forging Rolls are a most important factor in the equipment of a modern Forge Shop. For high speed, low cost production of many reduced straight and tapered forgings, wide adjustment forging rolls are of great advantage. These rolls are highly efficient in drawing blanks preparatory to forging in press, hammer or upsetter or for drawing slender shanks on pieces that have been previously forged. In forging production of Automobile Rear Axle Drive Shafts, Spring Leaves, Railroad Brake Levers, Brake Shoe Keys, Coil Spring Stock Pointing and a large variety of other reduced straight and tapered forgings, the use of a roll is especially advantageous. The operation of Ajax Rolls on blanks of steel, aluminum or magnesium is extremely simple and their production of long, uniform reduced straight or tapered sections from blanks of large cross section is many times that of the fastest swagers or hammers. Write for Bulletin No. 91-A.



THE AJAX

MANUFACTURING COMPANY
 EUCLID BRANCH P. O. CLEVELAND 17, OHIO
 110 S. DEARBORN ST. CHICAGO 3, ILLINOIS
 DEWART BUILDING NEW LONDON, CONN.
 W. P. WOOLDRIDGE CO., BURLINGAME, CAL. • LOS ANGELES 22, CAL.

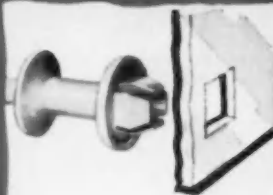
Here's Why SHAKEPROOF PLASTIC FASTENERS Do A Better Job At Lower Cost!



1. NON-CORROSIVE
Shakeproof Plastic Fasteners won't rust . . . often eliminate expensive corrosion-resistant metal fasteners.



In refrigerators, for example shelf supports must be completely rust-proof, easy to install, and very sturdy.



Shakeproof Plasti-Supports. Have the fastening action of a rivet . . . drive from one side only.



Won't chip or crack porcelain enamel. Save appliance manufacturers thousands of dollars yearly.



2. NON-CONDUCTIVE
Shakeproof Plastic Fasteners are made of excellent dielectric materials. They're self-insulating, often eliminate extra fasteners.



Mounting a "hot" TV chassis is critical. Manufacturers formerly used expensive bracket-to-bracket mountings.



Now, Shakeproof Plasti-Grommets eliminate these complicated devices. Simply snap them in, then drive a screw to spread the legs.



Plasti-Grommets install from one side . . . withstand loads of 500-600 lbs. . . . can save thousands of dollars on your production line.



3. COLOR-MATCH
You name the color . . . Shakeproof Plastic Fasteners will be matched to your color specifications.



In modern appliance, color-match is important to appearance when plugging left-over production holes.



Use color-matched Plasti-Plugs here and save the cost of expensive rack painting. They won't scratch or rust.



Just snap them in . . . and save yourself many production costs and headaches in matching colors.



Free Descriptive Literature

See for yourself how you can cut assembly costs and production time . . . and have a higher quality product. Drop us a note and we'll gladly send you complete descriptive literature on Shakeproof Plastic Fasteners.

SHAKEPROOF



"Fastening Headquarters"[®]

DIVISION OF ILLINOIS TOOL WORKS

St. Charles Rd., Elgin, Illinois • Offices in Principal Cities
In Canada: Canada Illinois Tools Limited, Toronto, Ontario

WORLD'S BROADEST LINE OF
MASS-ASSEMBLY FASTENINGS



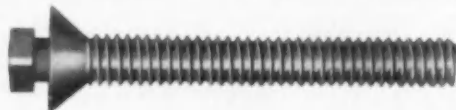
"ELCO SCREWS ARE GOOD SCREWS"

ELCO

...ASK A MAN WHO HAS USED THEM"



COLD-HEADED "SPECIALS"



"PRISON SCREWS"

If the title "prison screw" seems strange to you, the explanation is that the extended driver head breaks off when the screw is driven home — thus discouraging removal. The other "specials" illustrate a variety of the forming operations available at ELCO — heading, necking, serrating, thickening, flanging, chamfering, roll threading, and many others. ELCO facilities also include an Engineering Service that will help you design — or re-design — your special screws and similar pieces for *lowest-cost* manufacture. Always consult your ELCO representative.

ELCO PRODUCTS

WOOD SCREWS
MACHINE SCREWS
MACHINE SCREW NUTS
TAPPING SCREWS
THREAD-CUTTING SCREWS
PHILLIPS AND SEMS
SCREWS

PIPE PLUGS
STOVE BOLTS
CAP SCREWS
LAG SCREWS
DRIVE SCREWS
SPECIAL SCREWS
COLD HEADED PRODUCTS

ELCO TOOL AND SCREW CORPORATION

1914 BROADWAY, ROCKFORD, ILLINOIS

Thousands
of users know
FITZGERALD
Metallic Aluminum-
Fused-Oxide Steel Asbestos
GASKETS
end costly
gasket failures

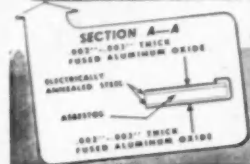
Specially designed,
ruggedly built, to
give a lasting,
perfect seal in high
compression engines,
gasoline or diesel.

There's a Fitzgerald
Gasket for Every Engine

Grease Retainers

Cork Gaskets

FITZ-Rite Treated Fiber
Gaskets for oil, gasoline
and water connections



FITZGERALD
gaskets
SINCE 1906

Handiest Locations in PITTSBURGH

Hotel Pittsburgher

PITTSBURGH, PA.

Diamond Street below Grant



Right in the heart of
the Golden Triangle—Hotel Pittsburgher

400 outside rooms with bath. Large-screen television
and radio at no extra charge in every room. Air con-
ditioning. Two restaurants. *Atlantic 1-6970*

Hotel Pittsburgher MOTEL

Opposite Greater Pittsburgh Airport on Airport
Parkway west. 56 air-conditioned rooms with large-
screen television at no extra charge, tile bath,
private phone. Courtesy
car to and from motel.
AMherst 4-5152

a Knott Hotel

JOSEPH F. DUDDY, GEN. MGR.

Note to Automotive Manufacturers: This advertisement is one of a series now appearing in dealer publications.

DIRECT MAIL ADVERTISING?

...What's in it
for Me?

HOMETOWN
MOTORS



Much more than you probably realize, Mr. Car Dealer.

Direct mail advertising is your most effective, your most selective selling tool. It makes more sales for you by pre-selecting your most likely prospects for new and used cars, parts and service . . . and it *saves* you money, too. It saves you money by reaching, at very low cost, only those people who qualify as your very best prospects.

More than that, direct mail builds a friendly, personal relationship with your present and potential customers. It's the ideal medium for developing your own public relations program, as well as your advertising program.

When you tie in direct mail with your national advertising support, you make *all* of your advertising dollars work more effectively. Your factory's direct mail program has been carefully planned to do a job locally *for you*. Direct mail advertising sells *you* to people who really count — your best local prospects.



R • L • POLK & CO. • PUBLISHERS • DETROIT

Aluminum



The Right Light Screw by SOUTHERN

Give time and weather resistance to your product and economy to your production with Aluminum screws by Southern —

Wood Screws - Machine Screws - Tapping Screws

Also from Southern — all standard size wood screws in Steel, Brass, Silicon Bronze and popular plated finishes, flat, round and oval with Phillips or slotted heads. Flat or round head, slotted steel stove bolts.

WOOD SCREWS • STOVE BOLTS • DOWEL SCREWS
MACHINE SCREWS • A & B TAPPING SCREWS
ROLL THREAD CARRIAGE BOLTS • HANGER BOLTS

Write for free samples and stock list. Box 1360-A2



Warehouses: New York
Los Angeles

Chicago
Dallas

Over 85% of the torque wrenches used in industry are

STURTEVANT TORQUE WRENCHES

Read by Sight, Sound or Feel

- Permanently Accurate
- Practically Indestructible
- Faster—Easier to use
- Automatic Release
- All Capacities

in inch grams
...inch ounces
...inch pounds
...foot pounds

Every manufacturer, design and production man should have this valuable data. Sent upon request.

P.A. STURTEVANT CO.
ADDISON QUALITY ILLINOIS



GET "THE BEST IN QUALITY SCREW MACHINE PRODUCTS"

TOUREK has become widely known for "THE BEST in Quality Screw Machine Products". More and more critical buyers who must have TOP quality are turning to TOUREK for parts they can depend upon to cut assembly time; cut costs; improve performance. Ask our experienced staff for help. Write today! **SEND FOR** illustrated 16-page Tourek Ball Joint Guide-Catalog. It's helpful. It's free!

J. J. TOUREK MFG. CO.

ESTABLISHED 1920

1901 SOUTH KILBOURN AVENUE, CHICAGO 23, ILLINOIS

UP TO 2-5/8" DIAMETER SINGLE AND MULTIPLE SPINDLE MACHINES
THREADING • TAPPING • MILLING • DRILLING • GRINDING •
POLISHING • PLATING • HEAT TREATING • SILVER SOLDERING

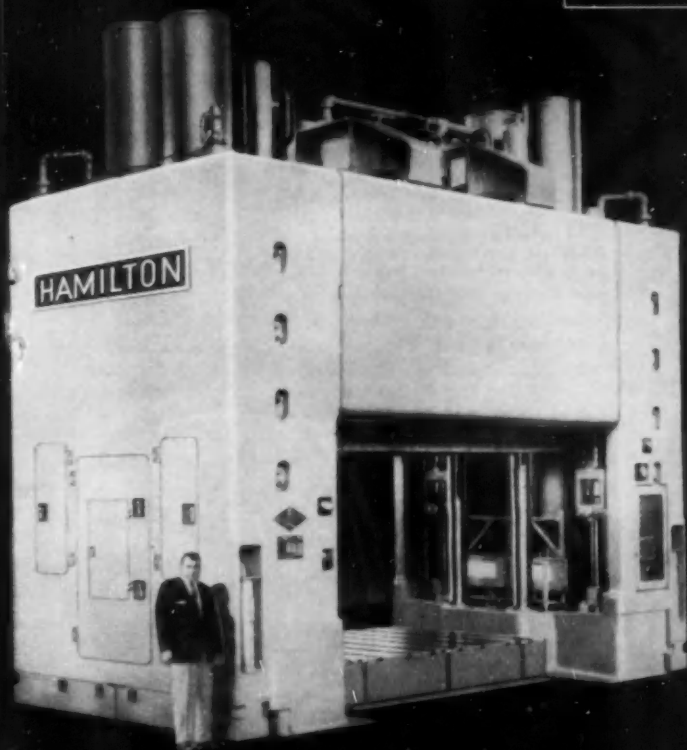
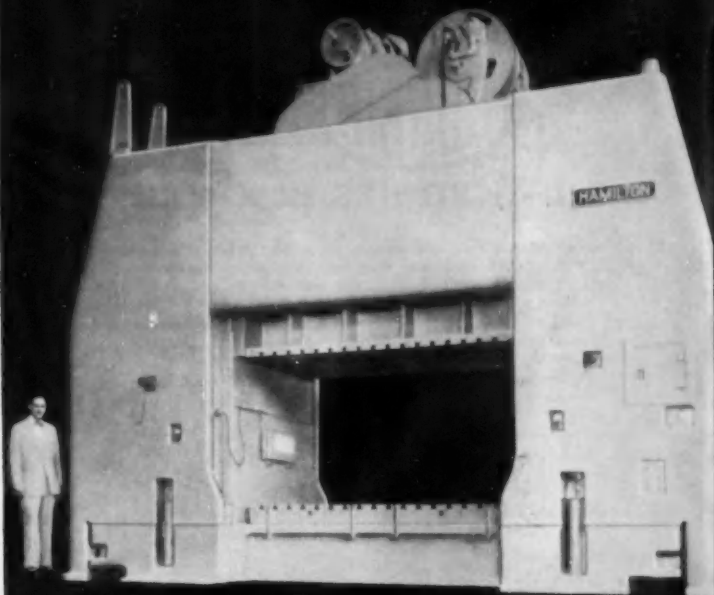
WORLD'S LARGEST MANUFACTURER OF "STANDARD" BALL JOINTS

**Ready
for Delivery...**

HAMILTON Presses

Now you can increase your productive capacity without delay. These Hamilton presses are in stock, as well as other single action, double action and triple action presses.

Hamilton's new unique policy of building these standard presses for stock means a sound investment for you. You'll profit by acting right away.



Like to get details on these available presses? Just pick up your phone and call Hamilton Division, Baldwin-Lima-Hamilton Corporation, Hamilton, Ohio.



Hamilton Division

BALDWIN-LIMA-HAMILTON

Top-Drawer Service
Top-Grade Quality



SELF-TIGHTENING HOSE CLAMPS

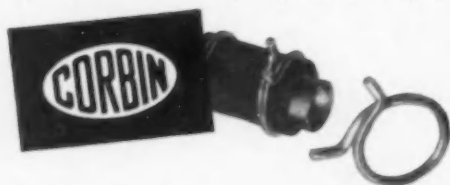
Save time, trouble, and money by using Corbin Self-Tightening Hose Clamps, the original permanent spring-tension clamp that is slipped over the connection . . . and when released automatically provides a positive, everlasting seal.

These Hose Clamps have won such widespread acceptance that virtually every automotive and appliance manufacturer in the U. S. A. is now using them.

Many users claim that when they switched from the older "screw-on" type to these self-tightening clamps, they were able to reduce labor costs by an amount almost equal to the total price they pay for Corbin-Design Clamps.

Stocked for IMMEDIATE shipment in ALL sizes to fit hoses $\frac{1}{8}$ " to $2\frac{1}{2}$ " diam.

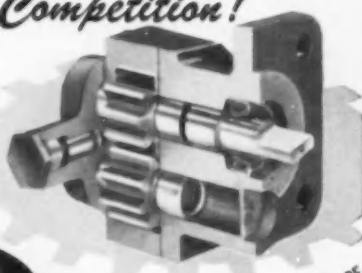
Write or phone for complete details. Corbin Hose Clamp Division, The American Hardware Corp., New Britain, Conn.



The Original Manufacturer of Self-Tightening Hose Clamps

BARNES PUMPS ARE DESIGNED

to beat Competition!



BARNES EXCLUSIVE GEAR TOOTH STRUCTURE
Offers highest efficiency, longest life,
with lower maintenance

- Exclusive Gear Tooth Structure
- Spring-Loaded Seal
- Self-Lubricating
- Built-in Relief Valve
- One size — Over 15 different capacities
- Port, Drive Shaft and Mounting Combinations
- Precision tooled

The vacuum condition present in ordinary gear pumps resulting in detrimental aeration and foaming, is eliminated by the exclusive patented Barnes Gear Tooth Structure.

Each tooth completely fills its mating space, forming a perfect seal, and eliminating the vacuum condition. By-passing or slippage of fluid between the gear teeth, from the compression to the intake chamber is reduced to substantially zero, assuring efficient displacement.

John S. Barnes Corporation
201 South Water Street
Rockford, Illinois
Please rush full details on
Barnes Hydraulic Pumps.

Name _____
Address _____
City _____ State _____
Title _____

JOHN S. **BARNES**
CORPORATION
201 South Water Street
Rockford, Illinois

Multiform BIG BROTHER BENDER

Model 888



SMALLER
MODELS
AVAILABLE



Illustrated above are a few of the many forms that can be produced efficiently on the Multiform Bender.

AIR OPERATED MODELS IN FOUR SIZES

The heavy duty Big Brother Bender is designed for fabricating bus bars, brackets, fixtures, etc., without special tooling. Air controlled with finger tip response. Comes complete with dies, mandrels and wrenches — punching and blanking dies extra. Will punch holes up to 1" and form material up to $\frac{1}{4}$ " thick by 4" wide. We also build smaller models, hand or air operated, for bending materials up to $\frac{1}{8}$ " x $1\frac{1}{2}$ ".

Send for illustrated folder AMI-2

J. A. RICHARDS CO.

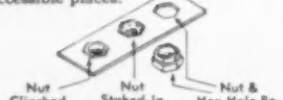
903 North Pittcher St.
Kalamazoo, Mich.

use these
GRIPCO CLINCH NUTS
with the exclusive
hex on hex
feature



for "fixed" fastenings for "hard-to-reach" or blind assemblies. They wear longer, hold tighter, give greater customer satisfaction.

See how leading appliance manufacturers get lower cost fasteners into inaccessible places.



Gripco Clinch Nuts can be either clinched solid for a rigid application or staked in with a six point staking punch to give a floating effect. This floating effect takes care of misalignment and makes the application of the bolt easier. Gripco clinch nuts can be clinched or staked with stationary or portable hydraulic or air equipment. Details on request. Write for samples and data sheet.

Typical Applications



GRIP NUT COMPANY

311-P 5. Michigan Avenue, Chicago 4, Illinois

113

Fallacies and Facts for Cemented Carbide Users

A few blunt—but needed—clarifications by the manufacturers of Carboloy Cemented Carbides

When you buy carbides, you're really buying *production ability*. You're buying *what carbides will do in your shop in terms of metal removal*.

If you're a tool engineer or designer, production foreman or machinist, you translate this into feeds, speeds, and depths of cut.

If you're in operating management, you also look for production ability, but you pinpoint it under the heading of greater machine efficiency, decreased downtime and lower tool inventories.

If you are a purchasing agent, your primary concern is getting the most for your money—but "most" in terms of production ability.

And, if you're in the top management group, your terms for production ability are: greater return on capital investment; decreased unit costs and increased gross margins.

The fallacy of overemphasizing the "Quickie Deal"

Be wary of the "quickie deal" involving price or discounts. You don't purchase with *production ability* in mind when you fall for these. Reason: while carbides look alike, *they don't perform alike*. And because of this fact, they can't be used interchangeably to bring the same on-the-job results. Their production ability varies—in some instances, tremendously.

The fallacy of the so-called "Industry Standard" Chart

Be wary, also, of the carbide salesman who shows a so-called "industry standard" carbide grade selection chart and says that each producer's grade within a category will perform equally well. They won't, because these are merely recommendation charts, not "equivalent" or "comparison" charts. Like most other products, carbides are made by different manufacturing processes and techniques, with varying degrees of engineering know-how and quality control exerted during processing. (Carboloy has one carbide engineer in its home office for every two salesmen in the field!)

The fallacy of using "Carboloy" to mean any brand of cemented carbide

And be wary of the salesman who tells you that his company makes "Carboloy." Unless he's one of our 70

field sales engineers or a representative of our 130 Authorized Distributors, his claim is in error. The name "Carboloy" is our registered trademark. It cannot be used synonymously with "cemented carbides" because it refers to one brand, and to one brand alone—Carboloy cemented carbides.

However, we do frequently receive complaints from people who say they have been sold "Carboloy," when they actually got another brand of cemented carbide that could not equal true Carboloy cemented carbide in *production ability*. Having our name used so freely by others is, we suspect, a problem that might come under the heading of "The Penalty of Leadership."

The facts about the need for advanced carbide engineering

Another facet of the responsibility that goes with leadership in the carbide industry, is the continuing engineering program carried on by our organization to prevent what might be termed a stagnant technology in the carbide field.

You, the user, impose ever-increasing demands on cemented carbides. And this advanced Carboloy development program is a major factor in keeping this vital phase of metallurgy ahead of the requirements you impose.

This emphasis on technical progress—resulting most recently in the new Carboloy Series 300 carbides—is another of the plus factors built into our product that the user can't always see.

The facts you can determine for yourself

We offer this suggestion—when you buy or use carbides, find out for yourself which carbide will give you the most production. If you care to, ask a Carboloy sales engineer to help you run the tests—but you set them up, in *your own shop*. Then compute your carbide cost based on *production ability*.

We have hundreds of in-plant case histories proving what our grades will do under any operating conditions. They show you how you get more for your carbide dollars when you specify Carboloy cemented carbides from your distributor or toolmaker. Write, or call, for assistance in getting the most out of your tooling dollars.

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

CARBOLLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY

11151 E. 8 Mile Road, Detroit 32, Michigan

Carboloy Created-Metals for Industrial Progress

Insist on VELLUMOID!

Don't Take Chances!

The best overhaul job can be ruined by a defective gasket. Always use VELLUMOID for tight, lasting seals on all oil, water and gasoline connections.

THE VELLUMOID COMPANY • Worcester

CHICAGO PRESSES

Straight Side — Double Crank
All-Welded Steel Construction

CAPACITIES 50 to 400 tons
LENGTHS 4 to 16 feet



DREIS & KRUMP
MANUFACTURING COMPANY

7420 S. Loomis Blvd., Chicago 36, Illinois



DYKEM STEEL BLUE

Stops Losses
making Dies and
Templates



Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

THE DYKEM COMPANY
2301L North 11th St. • St. Louis 6, Mo.

KWIK-CHK

A NEW OUTSTANDING METHOD IN THE FIELD OF GAGING SMALL DIAMETER HOLES. DIRECT ACCURATE READINGS WITHIN 5/10,000 of an inch

PRECISION HOLE GAGES



\$37.50 each \$110.00 set of 3

Including plush-lined leather covered case with steel precision setting gage.

Ask your Jobber for FREE Brochure
or Write **NEW STANDARD DIVISION**
U. S. EXPANSION BOLT CO. YORK, PA. DEPT. AI-7

CUT SCRAPER TIME

END NIGHT CLEANUP & MORNING REBLUING
DYKEM HI-SPOT BLUE No. 107 is used to locate high spots when scraping bearing surfaces. As it does not dry, it remains in condition on work indefinitely, saving scraper's time. Intensely blue, smooth paste spreads thin, transfers clearly. No grit; noninjurious to metal. Uniform. Available in collapsible tubes of three sizes. Order from your supplier. Write for free sample tube on company letterhead.

THE DYKEM CO., 2301L NORTH 11TH ST., ST. LOUIS 6, MO.

Classified Advertisement

DESIGNING ENGINEER—Nationally known manufacturer of industrial seating has an excellent opening for a designing engineer, preferably with seating experience. Give full details in first letter. Box 36, Automotive Industries, Chestnut & 56th Streets, Philadelphia 29, Pa.



Fellows
MACHINES AND TOOLS FOR
GEAR PRODUCTION

The Fellows Gear Shaper Company, Springfield, Vt.



New RAILS Relaying

TRACKWORK OF ALL KINDS

LIGHT RAILS—12 to 40 lb.—20" & 30"
HEAVY RAILS—40 to 100 lb.—10" & 11"
JOINT BARS, BOLTS, TIE PLATES, SPIKES & TOOLS, FROGS, SWITCHES, STANDARD & SPECIAL TRACKWORK.

SEND US YOUR INQUIRIES
KASLE STEEL CORPORATION
ONE SIX HUNDRED FIVE FIFTH STREET ST. LOUIS, MISSOURI 63103

AUTOMOTIVE INDUSTRIES'

Readers
are always well
Informed



AUTOMOTIVE INDUSTRIES
MACHINE TOOL
and
PRODUCTION EQUIPMENT
ISSUE ⚡⚡⚡ **SEPTEMBER 1, 1955**



This impressive issue will be mailed August 30th to reach readers before show time. And . . . 56% of A.I. subscriptions are home addressed, assuring intensive pre-show readership.

DEVOTED EDITORIALY TO THESE THREE MAJOR SHOWS

Automotive and aviation executives attending these shows will have a timely preview of the outstanding new equipment on exhibition, with a special section keyed to each show. For those unable to attend, the Machine Tool and Production Equipment Issue will be a valuable "show in print."

MACHINE TOOL SHOW

**PRODUCTION ENGINEERING
SHOW**

**COLISEUM MACHINERY
SHOW**

**WILL INFLUENCE OVER 17,500 PRODUCTION,
ADMINISTRATIVE and ENGINEERING EXECUTIVES IN . . .**

The September 1st issue will reach the buying teams of 3,648 companies making cars, trucks, buses, aircraft, engines, parts, tractors, agricultural and construction equipment, machine tools. It will be read at the time when plans are being made on what to see . . . what to inspect . . . what to buy at the Chicago shows.

**THE \$27.5 BILLION
AUTOMOTIVE
AND AVIATION
MANUFACTURING FIELD**

**AMERICA'S No. 1 INDUSTRIAL AND METALWORKING MARKET
WHICH SPENDS OVER \$14 BILLION ANNUALLY . . .**

Sell to America's biggest metalworking market . . . through the pages of the AUTOMOTIVE INDUSTRIES Machine Tool and Production Equipment Issue.

CLOSING DATES:—July 25th for special position ads, August 1st for all other ads, August 1st for editorial material.

CONSUMES

**41% OF ALL
METAL WORKING STEEL**

**60% OF PRODUCTION
MACHINE TOOLS**

41% OF CUTTING FLUIDS

52% OF DIE CASTINGS

AUTOMOTIVE INDUSTRIES

Chestnut & 56th Sts., Phila. 39, Pa.



A CHILTON Publication

THE NEWS MAGAZINE OF AUTOMOTIVE and AVIATION MANUFACTURING

Index to Advertisers

This Advertisers' Index is published as a convenience, and not as part of the advertising contract. Every care will be taken to index correctly. No allowance will be made for errors or failure to insert

A	
AC Spark Plug Div.	121
Acadia Div. Western Felt Wks.	10
Ackermann Mfg. Co.	129
Aetna Ball & Roller Bearing Co.	123
Ajax Manufacturing Co.	236
Allen Mfg. Co.	133
Allison Div. G.M.	225
Aluminum Co. of Amer.	26
American Bosch Div. American Bosch	
Arma Corp.	185
American Chemical Paint Co.	150
American Machine & Foundry	
Co.	3rd Cover
American Steel & Wire Div.	209
Aro Equipment Corp.	21
Associated Spring Corp.	46
Auto Specialties Mfg. Co.	207
Automotive Industries	245

B	
Baker Bros., Inc.	223
Baldwin-Lima-Hamilton Corp.	241
Barnes Corp., John S.	242
Barnes-Gibson-Raymond	46
Ballows Co.	201
Bendix Aviation Corp.	
Products Div.	34
Zenith Carburetor Div.	15
Bergen Wire Rope Co.	191
Bethlehem Steel Co.	219
Binks Mfg. Co.	168
Borg & Beck Div.	166
Box 94-95	208
Buckeye Tools Corp.	170
Buffalo Bolt Co.	164
Bundy Tubing Co.	182-183
Burton Auto Spring Corp.	214

C	
Carboloy Co.	243
Chicago Rawhide Mfg. Co.	27
Chicago Rivet & Machine Co.	154
Clark Bros. Co.	233
Clark Equipment Co.	111-112
Classified Advertisement	244
Clearing Machine Corp.	173
Cleveland Punch & Shear Wks. Co.	216
Columbia-Genova Steel Div.	135-209
Colonial Broach Co.	14
Consolidated Machine Tool Co.	28-29
Continental Screw Co.	95
Continental Tool Works Div.	109
Coolidge Corp.	128
Corbin Hose Lamp Div.	242

D	
Dana Corp. (Spicer)	144-145
Davis & Thompson Co.	198
Detroit Controls Corp.	186
Dole Valve Co.	146
Dreis & Krump Mfg. Co.	244
Dunbar Bros. Co.	46
du Pont de Nemours Co., Inc.	
Photo Products Dept.	235
Dykem Company	244

E	
Eaton Mfg. Co.	80
Elastic Stop Nut Corp.	47
Elco Tool & Screw Corp.	238
Electric Auto Lite Co.	107
Elox Corp. of Mich.	131
Emery Co., A. H.	153
Ex Cell O Corp.	109

F	
Fairchild Engine & Airplane Corp.	174
Fairfield Mfg. Co.	184
Farval Corp.	82
Fasco Industries, Inc.	180
Federal Machine & Welder Co.	143
Federal-Magul Corp.	195
Fellows Gear Shaper Co.	244
Felters Co.	132
Fitzgerald Mfg. Co.	238
Foot Co.	50
Fuller Mfg. Co.	167

G	
General Tire & Rubber Co.	197
Gisholt Machine Co.	17-18-19-20
Gordon Co., Claud S.	204
Great Lakes Steel Corp.	8
Grip Nut Company	242

H	
Hannifin Corp.	25
Harrison Radiator Div.	11
Harvey Aluminum Sales, Inc.	161
Heald Machine Co.	2nd Cover
Hahman Plating & Mfg. Inc.	196
Holley Carburetor Co.	175
Hotel Pittsburgher	238
Houghton & Co., E. F.	165
Hyatt Bearings Div.	5
Hy-Pro Tool Co.	95

I	
Inland Mfg. Div.	24

J	
Johnson Products, Inc.	203

K	
Kaiser Aluminum & Chemical Sales, Inc.	212
Kasle Steel Corp.	244
Kearney & Trecker Special Machinery Div.	105
Keller Tool Div. Gardner-Denver	210
Kelsey Hayes Wheel Co.	215
Kent-Owens Machine Co.	33
King Seely Corp.	217
Kingsbury Machine Tool Corp.	148-149

L	
Lamb Electric Co.	188
La Pointe Machine Tool Co.	12
La Salle Steel Co.	177
Leece-Neville Co.	162-163
Lemart Engineering Co.	206
Lindberg Industrial Corp.	30
Linde Air Products Co.	32
Link Belt Co.	13
Lipe-Rollway Corp.	31
Loddell Div. United Engineering	
Fdry. Co.	192
Lodge & Shipley Co.	218
Lucas-Milhaupt Engineering Co.	204

M	
McKay Machine Co.	181
McLouth Steel Corp.	151
M. B. I. Export & Import Ltd.	4
MacLean-Fogg Lock Nut Co.	208
Malayan Tin Bureau	247
Mallory & Co., Inc., P. R.	229
Mattison Machine Works	2
Michigan Tool Co.	172
Millford Rivet & Machine Co.	247
Miller Fluid Power Co.	77
Milwaukee Div.	46
Modern Industrial Engineering Co.	194
Moline Tool Co.	130
Moraine Products Div.	139
Morse Chain Co.	159
Match & Merryweather Machinery Co.	202
Murray-Way Corp.	220
Muskegon Piston Ring Co.	16

N	
Nadella	222
National Broach & Machine Co.	155
National Malleable & Steel Castings Co.	156
National Motor Bearing Co.	205
National Screw & Mfg. Co.	81
National Steel Corp.	8
National Tube Div.	135-209
New Departure Div.	44
New Standard Div.	244
Niagara Machine & Tool Works	136-137
Norton Company	48-49

O	
Oakite Products, Inc.	213
Ohio Div.	46
Orman-Miller Machine Co.	193
Osborn Mfg. Co.	118

Index to Advertisers

—continued

P	
Palnut Co.	176
Parker Rust Proof Co.	232
Pesco Products Div.	79
Peters-Dalton, Inc.	120
Planet Corp.	138
Polk & Co., R. L.	239
Potter & Johnston Co.	78
Purolator Products, Inc.	152

R	
Ransburg Electro-Coating Corp.	122
Rathborne Hair & Ridgeway Box Co.	158
Raymond Mfg. Co.	46
Reliance Electric & Engineering Co.	101
Ren-ite Plastics, Inc.	124
Republic Steel Corp.	22-23
Richards Co., J. A.	242
Richardson Co.	142
Rockford Clutch Div.	134
Ross Gear & Tool Co.	9
Ryerson & Son, Inc., Jos. T.	36

S	
Sahlin Engineering Co., Inc.	179
Schwitzer-Cummins Co.	99
Sealed Power Corp.	147
Shakeproof Div. Illinois Tool Wks.	237
Sheffield Corp.	211
Southern Screw Co.	240
Sturtevant Co., P. A.	240

Sun Oil Company	6-125-126-127
Superior Steel Corp.	117
Synchro-Start Products, Inc.	103

T	
Tempco Aircraft Corp.	51
Tennessee Coal & Iron Div.	209
Thompson-Bremer & Co.	3rd Cover
Timken Roller Bearing Co.	Back Cover
Tomkins-Johnson Co.	119
Torrington Co.	97
Tourek Mfg. Co., J. J.	240
Towmotor Corp.	160
Tung Sol Electric, Inc.	200
Twin Div. Clutch Co.	221

U	
United Air Lines, Inc.	113
United-Carr Fastener Corp.	224
United States Rubber Co.	116
United States Steel Corp.	135-209
United States Steel Supply Div.	209

V	
Vellumoid Co.	244
Verson Allsteel Press Co.	230
Vickers, Inc.	157
Victor Mfg. & Gasket Co.	7

W	
Wagner Bros., Inc.	114-115
Wagner Electric Corp.	227
Waukesha Motor Co.	1
Wean Equipment Corp.	199
Webb Co., Jarvis B.	189
Western Felt Works	10
Westinghouse Electric Corp.	169-170-171
Wheland Company	228
White Industrial Div., S. S.	140
Wittek Mfg. Co.	206
Wood Co., R. D.	187
Wrought Washer Mfg. Co.	231

Y	
Yates-American	190
Young Spring & Wire Corp., L. A.	141
Youngstown Sheet & Tube Co.	234

Z	
Zagor Tool, Inc.	226
Zollner Machine Works	248



When you need tubular rivets, you want them GOOD and you want them FAST. 5 Milford plants and 20 Milford offices see that you always get BOTH!

**THE
MILFORD
RIVET & MACHINE CO.**

Plants: Milford, Conn.; Norwalk, Calif.; Elyria, Ohio; Aurora, Ill.; Hatboro, Pa.
Offices: Atlanta, Chicago, Cleveland, Detroit, Fort Worth, Indianapolis, Newark, New York, Pittsburgh, Racine, St. Louis, St. Paul, San Francisco, Seattle, Norwalk, Calif.; Stratford, Conn.; Charlotte, N. C.; Seneca Falls, N.Y.; Jenkintown, Pa.; Westwood, Mass.

Headquarters for RIVETS
Tubular, solid and special cold-chamber
and Rivet-setting Machines



Get This Informative Free Booklet on New Uses for Straits Tin

New, 20-page booklet tells important story of Straits Tin and its many new uses today. Fully illustrated. Includes sections on new tin alloys, new tin solders, new tin chemicals. Covers tin resources and supply, Malayan mining. Booklet is factual, informative—could well prove profitable to you. Mail coupon now.

THE MALAYAN TIN BUREAU

Dept. P, 1028 Connecticut Ave., Washington 6, D.C.

Please send me a copy of your free booklet on new uses for Straits Tin.

Name _____
Firm Name _____
Street _____
City _____ Zone _____ State _____

SENSATIONAL MILEAGE

**STOPS! RING
GROOVE WEAR**

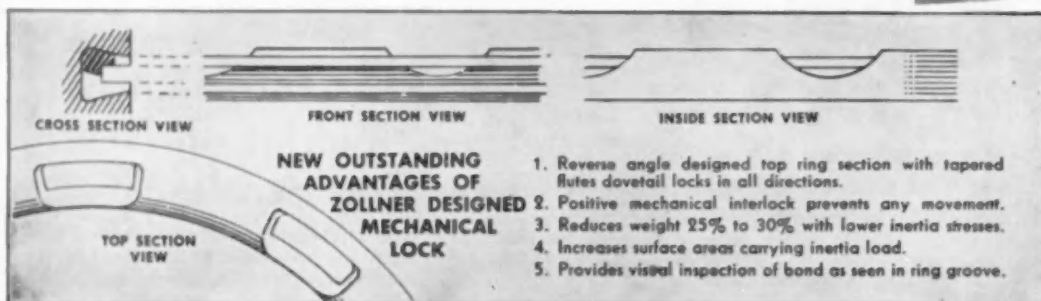
Double Bonded

METALLURGICALLY
Al-Fin Bond

MECHANICALLY
Zollner Lock

ZOLLNER
"Ni-Resist" Iron Top Ring Section
BOND O-LOC
For Extra Heavy Duty Service
PISTONS

Up to 5 times more mileage is typical of this great new piston development by Zollner engineers. Designed for the most severe service, the BOND-O-LOC Piston has a "Ni-resist" iron top ring groove section permanently incorporated by both Al-Fin metallurgic bond and the exclusive Zollner mechanical lock. Separation failure is impossible. Reverse angles on every surface joining the "Ni-resist" iron section provide a multiple dovetail bond which is infinitely wedge-locked. Ring groove wear problems are eliminated, blow-by prevented, oil consumption reduced, mileage between overhauls greatly increased. Many heavy duty engine builders have already tested and approved BOND-O-LOC advantages. Request complete information, now.



Licensed under Patents 2,396,730; 2,455,457; 2,550,879 * T. M. Reg. Pat. App. For

- ADVANCED ENGINEERING
 - PRECISION PRODUCTION
- in cooperation with engine builders

ZOLLNER THE ORIGINAL EQUIPMENT PISTONS
ZOLLNER
PISTONS

ZOLLNER MACHINE WORKS • Fort Wayne, Indiana

TIGHT and SECURE
LAP AFTER GRUELING LAP
in the Indianapolis "500 Mile Classic"

Everlock

INDUSTRIAL FASTENERS



1st—BOB SWEIKERT

"I've got to be sure of tight connections. That's why I chose Everlock lock washers. They really stay tight."

Bob Sweikert



2nd—TONY BETTENHAUSEN

"Big or small, in every race my car is equipped with Everlock lock washers. I know I can depend on 'em."

Tony Bettenhausen



3rd—JIM DAVIES

"Everlock lock washers held perfectly tight all through the terrific punishment of the race."

Jim Davies

EVERLOCK lock washers keep vital connections tight under the unmerciful pounding of competitive racing. Their exclusive alternating chisel edges provide a *double surface grip* — actually bite into both screw and work with a *permanent, vibration-proof grip*.

To Keep Your Product Tight choose EVERLOCK and *fasten it and forget it*. In a complete range of stock sizes, types and materials, or to meet your individual "specs."

THOMPSON-BREMER & CO.,
 512 N. Dearborn St., Chicago
 10, Ill. A subsidiary of AMERICAN
 MACHINE & FOUNDRY COMPANY,
 NEW YORK



FREE CATALOG

Your "bible" for the best
 in lock fasteners. Send
 for your copy today.



THE NUMBER 6 on the bearing cup at right, together with 5BC on the cone, tells you that this is a tapered roller bearing used on steering gears. But when the number is accompanied with the trade-mark "Timken®", it also predicts future years of trouble-free operation. Why? Because of the quality and service that go with every Timken bearing.



THE NUMBER THAT PREDICTS THE FUTURE



IN JUST 40 SECONDS this spectrometer tells the exact chemical composition of a melt of Timken bearing steel. Results are flashed back to the furnace so our melter has constant control of the chemical analysis. We make our own steel to control bearing quality every step of the way. We're America's only bearing maker that does. And we make the steel nickel-rich for added toughness.








CATCHING REJECTS before they happen is the job of our statistical quality control. For instance, a chart like this on every grinder plots the dimensions of several cups or cones from each lot. Trends towards off-size bearing parts show up instantly. This is another step we take to make Timken bearings the No. 1 value in your cars' moving parts—the vital zone.



OUR ENGINEERS WILL HELP YOU design bearing applications for your product—at no cost to you. They can often suggest improvements and more economical installation methods. This service is one more reason to always specify "Timken" with a bearing number. And for full value, always use a Timken bearing cup with a Timken bearing cone. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN IS NUMBER 1 FOR VALUE WHERE VALUE COUNTS MOST... IN THE VITAL ZONE

TIMKEN BEARING CO. INC. CANTON 6, OHIO

NOT JUST A BALL  NOT JUST A ROLLER  THE TIMKEN TAPERED ROLLER  BEARING TAKES RADIAL  AND THRUST  LOADS OR ANY COMBINATION 